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# ATTAINMENT LEVELS OF COMPREHENSIVE PRIMARY SCHOOLS IN ICELAND

by

© Fridgeir Borkur Hansen

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
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IN
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Date January 24, 1984

# DEDICATION

*Dedicated*
*to my wife,*
*Gudrun*
*and my children,*
*Silja Hrund and Gudsteinn Haukur.*

## ABSTRACT

The major purpose of this descriptive and exploratory study was to examine the relationship between school attainment (school average scores) of comprehensive primary schools in Iceland and selected "school" and "teacher" variables. The conceptual framework employed was drawn from the open systems theory. Students were seen as inputs into schools and their scores on the comprehensive primary school examinations as outputs affected by forces that act upon them. Furthermore, schools were seen as organizations concentrating on fulfilling their official and operative goals.

The data collected were official records provided by the Ministry of Culture and Education in Iceland. The study was delimited to quantitative data in the form of staff lists (principals and teachers) and statistical records of classes for individual schools. The sample for the study could be considered as being the total population of comprehensive primary schools that offer grade nine.

To fulfill the study purpose, the study was guided by two major objectives and four sub-problems. Objective one was to search for patterns in school attainment (school average scores). The findings for objective one can be summarized by saying that school average scores in the four subject areas, Icelandic, English, Danish, and mathematics whether high or low, are likely to remain so. Objective two was to examine the relationship between selected "school" and "teacher" variables and school average scores. Generally, the variables "Greater Reykjavik" and "coastal areas" were the best overall predictors of school average scores, whether it be in the high or the low category.

The study concludes by discussing the findings with regard to related literature and by providing some implications and recommendations for further research.

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## Chapter I

## INTRODUCTION

What exactly makes the difference in educational outcomes? This has been a frequent question in educational research over the last few decades. The question could be expanded beyond what makes the difference to how much of a difference and of what nature. There are numerous ways and approaches which may provide answers to these questions.

The so called input-output model is one of the most frequently used in this context. As Bridge et al. (1979) point out, the major goal of the input-output approach is to identify important variables that are connected with educational outcomes (p.9). Cohn et al. (1975) say when describing the input-output approach:

> In its most basic form, the process of input-output analysis is a research strategy through which one attempts to measure changes in system output(s) brought about by changes in the quantity and quality of system inputs (p.7).

It could be argued that the input-output approach is rooted in the open systems theory, a perspective employed in organizational research. One of the problems of using the open systems approach, or in its simplest form, the input-output model, is how to define output. It is also problematic and difficult to clearly separate the school and the non-school variables that create or influence the output. There are, however, many factors that have been viewed as inputs in the schooling process, factors like IQ, sex, personality, age, family size, wealth, status, racial composition, training of teachers, size of schools, curriculum and so forth.

Authors in the field have tried to develop models that depict the relationships among the many variables which are assumed to contribute to variance in student learning. Models in this area are often based on reviews of the literature that deal with school effects and are intended to serve as guidelines in dealing with the many factors that affect student learning. In other words, structural models of this nature describe potential relationships between variables. Centra and Potter (1980), as well as Glasman and Biniaminov (1981), have developed two such models. In the former, the focus is more on administrative variables than in the latter, where the focus is more on students and within school conditions. However, both these models are composed of three main input-variable clusters; student variables, school variables, and teacher variables. Once an output measure or dependent variable(s) and a set of independent variable(s)have been determined, the task is to find out how much each variable contributes to the output.

In this study, schools are seen as goal seeking organizations concentrating on fulfilling their official and operative goals. The schooling process is described by employing some concepts of open systems theory. In other words, students are seen as inputs into schools and their examination scores as outputs, affected by forces that act upon them during the schooling process.

To fulfill the study purpose, the thesis is divided into seven major chapters. The chapter following this introduction brings the problem and its background into perspective. In chapter three, the conceptual framework is discussed, and in chapter four a review of the related literature is presented. The research design is presented in chapter five, and the analysis of the data in chapter six. In the final chapter an overview is presented, the major findings are summarized, and some implications and conclusions are drawn from the study.

## Chapter II

## THE PROBLEM AND ITS SETTING

### A. BACKGROUND FOR THE STUDY

Iceland can be labelled as a relatively homogeneous, small and culturally independent society. The island itself is the second largest island in Europe, its total area is 103,100 sq.km. and it is located in the North Atlantic Ocean, close to the Arctic Circle. The population of Iceland is 240,000 people. Approximately fifty percent of the population lives in the South-West corner, essentially in the capital city, Reykjavik, and the surrounding area.

The educational system in Iceland is under governmental control and education is free in all schools. The educational system is organized into three main levels;

(1)comprehensive primary education (age 7-16)
(2)secondary education (age 16-20)
(3)post-secondary education (age 20 and older)

Preschool (age 6) is in most cases organized within the comprehensive primary school system, but is not compulsory. Grades one to eight in the comprehensive primary school system are compulsory, but not grade nine. It may, however, be made compulsory soon, in accordance with a change in legislation presently under discussion in Iceland.

Some private schools at the secondary level are private, but most of them receive some financial support from the government and must conform to the educational standards set by the Ministry of Culture and Education.

According to the legislation on comprehensive primary education enacted in 1974, the aims of schooling are;

> In cooperation with the home, the school must prepare the children for life in a modern democratic society. The schools should therefore be guided in their work by tolerance, Christian values and democratic cooperation. The school should endeavor to widen the childrens' horizon and develop their understanding of their environment, social conditions, the characteristics and history of Icelandic society and the obligations of the individual to society.
>
> The school must endeavor in its work to meet the demands and needs of the child and give each individual an opportunity to develop intellectually and physically.
>
> The school must enable the children to gain knowledge and develop their skills and methods of work, in a constant effort to gain mental and physical maturity. The school must therefore foster independent thought and cooperative attitudes. (Law for Comprehensive Primary Education, 63/1974, article 2)(quotation from Proppe,1983)

The Ministry of Education is to provide schools with guidelines for each subject, according to the law on comprehensive primary schooling. The external exams in grade nine are based on those guidelines, or curriculum guides, which clearly state what is to be taught.

Students are in most cases not selected or streamed when going to school. Instead, geographical determinants are used in most school districts, where students attend the school that is located closest to their residence. There are, however, some schools that differ from this basic rule where students are selected according to their achievement level or other criteria.

Within every school students are divided randomly into classes if there is more than one class for each grade. When students go through the K-9 system, they are promoted (normally) one class forward every year, regardless of course grades.

In grade nine, assessment is carried out both by each individual school and by other educational authorities. The comprehensive examinations are administered at the same time, usually in February, in every school offering grade nine. The subjects under examination are usually Icelandic, mathematics, Danish and English, but it varies between years. In some years examinations are administered in more than these four subject areas. During the years 1978-79 to 1981-82 Danish, English, Icelandic and mathematics were administered every year. All these subjects were compulsory except Danish and English in 1978-79 and 1979-80 were options.

Secondary school admission requirements take into consideration the students' performance at both the comprehensive examinations and their school examinations. Most schools use the one to ten scale. The comprehensive exams are also marked on a one to ten scale before they are norm referenced on a scale of A, B, C, D, E. Approximately 7% of the grade nine population gets A, 24% B, 38% C, 24% D, and 7% E.

About 100 schools offer grade nine, and the annual number of students that complete grade nine has been approximately 4000 since 1977. Table 1 shows the number of students graduating from the comprehensive primary schools in Iceland in 1977 - 1982. The pass and fail numbers are in accord with the official standards for entry requirements for the secondary schools.

About 93 percent of the total age-group graduates from grade nine in the comprehensive primary school. Some of the remaining 7 percent have never been in comprehensive primary schools at all (e.g., severely handicapped and mentally retarded), and the dropout rate between grade 8 and grade 9 is close to 3 percent of the total age group (Proppe, 1983 p.222).

## B. THE PROBLEM

At the age of fifteen or sixteen, the grade nine students undergo external examinations in four subjects. These examinations, "The National Comprehensive Primary School Examinations", are the same for every student and are undertaken at the same time in every comprehensive primary school in Iceland. The raw scores in the four subject areas under examination may show that the mark averages differ significantly between schools.

This research problem examines the relationship between school attainment based on marks on the comprehensive school examinations and some physical and administrative features (school variables and teacher variables) of comprehensive primary schools in Iceland.

Table 1

Pass and Fail Percentage of the Total Grade Nine Student Population for the School Years 1977 to 1981

| Spring of graduation | Total student population | No. of students which passed the entry requirements | | No. of students which failed the entry requirements | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| 1977 | 4002 | 2690 | 67.2 | 1312 | 32.8 |
| 1978 | 4179 | 2854 | 68.3 | 1325 | 31.7 |
| 1979 | 4255 | 2919 | 68.6 | 1336 | 31.4 |
| 1980 | 4165 | 2878 | 69.1 | 1287 | 30.9 |
| 1981 | 4180 | 2961 | 70.8 | 1219 | 29.2 |

(Proppe 1983, p. 221)

## C. OBJECTIVES

The first objective of the study was to search for patterns in attainment by analyzing comprehensive primary school scores for the school years 1978-79 to 1981-82.

The second objective was to examine the relationship between the following selected variables and school attainment (school average scores) during the school years 1978-79 to 1981-82.

SCHOOL VARIABLES

(1)the size of school (number of students)

(2)school type (boarding school, boarding/regular school, and regular school)

(3)school region

(4)number of students undergoing exams

(5)position type (full time, 2/3 time, half time)

(6)operating time (8, 8 1/2, or 9 months)

(7)staff turnover (number of new teachers in school compared to last year)

(8)administrative turnover (principal the same as last year)

(9)number of grade levels in school

(10)geographical location of the school

TEACHER VARIABLES

(1)sex of principals

(2)age of principals

(3)age of teachers

(4)teachers' teaching experience per school

## D. ASSUMPTIONS

The first assumption for the study is that students' I.Q. within the comprehensive primary school system in Iceland is randomly distributed.

The second assumption is that differences in school score attainment, as measured by the comprehensive primary examinations, are adequate as the basis for discriminating between schools.

## E. DELIMITATIONS AND LIMITATIONS

This study will be delimited to Icelandic comprehensive primary schools offering grade nine. The study is also delimited to the examination of selected physical and administrative features of comprehensive primary schools in Iceland. The data are delimited to those provided by The Ministry of Culture and Education, as well as some other resources available to the researcher.

The interpretations of the researcher are limiting factors, as is his distance from the scene. The study is also limited by the variables selected for examination in this initial study and by the dependance upon existing data.

## F. THE IMPORTANCE OF THE STUDY

Very little is known in Iceland about factors related to the differences in average scores on the comprehensive exams. A descriptive and exploratory study of this nature may increase the understanding of how some factors might be related to student achievement.

The research results of this study can be used for policy recommendations. What is gained from the results can be used as input to the "knowledge required to link desirable outputs (i.e., values and goals as determined in the political process) with needed inputs (i.e., specific government programs)" (Benveniste, 1977 p.78).

This research project is intended to be part I of a larger study and is to serve as a guide for further inquiry.

## G. DEFINITION OF TERMS

School attainment is the term used for the level of students' scores for each individual school. The terms "achievement" and "attainment" are used interchangeably in this document.

Comprehensive primary education is one of three levels of the educational system in Iceland. The levels range from grades K to 9, or from the age of six to fifteen. It should be noted that grade nine is not compulsory, but that about 93% of the the total age group graduates from the comprehensive primary school at the end of grade nine.

Geographical location of schools. The classificatory scheme was: Reykjavik (the capital) Inner City, Reykjavik Suburban, Reykjavik Neighborhood, Akureyri (the second largest town), Towns (1000-13000) coastal and rural, Villages (500-1000) coastal and rural, and Hamlets (less than 500) coastal and rural. It was considered meaningful to have Reykjavik Neighborhood as a separate category instead of classifying it as a coastal town. Also, the category rural Hamlets could have been called small country schools.

School regions. The Icelandic primary school system is divided into eight school regions. In every school region there is an elected board of education and a regional superintendent who is appointed by the Ministry of Education and Culture. The superintendent is responsible for administration in all the primary schools in the region. He is also responsible for the social and psychological services in the schools in his region.

Norm-referenced. This term is used for the translation of student raw scores into normally distributed marks. In this study, only the raw scores will be used, except when transformation to z-scores is necessary.

Position types. Teachers with tenure in the comprehensive primary school system can hold partial positions as well as full time positions. A teacher holding a full time position teaches 30 sessions a week, a teacher holding a 2/3 position teaches 20 sessions a week, and a half time teacher teaches 15 sessions a week.

## H. SUMMARY

In this chapter the problem and its setting was presented. The first section of the chapter provided some background information for the study. In section two and three the problem and the objectives of the study were stated. The major objectives of the study were to search for patterns in school attainment levels (school average scores), as well as to examine the relationship between school attainment and some "school" and "teacher" variables.

The assumptions, limitations and delimitations of the study were presented in section four and five, and in section six the importance of the study was presented. Very litle is known in Iceland about factors related to school attainment levels (school average scores). The variables (proxies) developed from the data available may increase the understanding of the differences in school attainment levels.

In section seven, definitions of the major terms employed are presented.

## Chapter III

## CONCEPTUAL FRAMEWORK

The major purpose of this chapter is to describe the conceptual framework for the study. The chapter is divided into three major sections. In section one, perspectives in organizational research are discussed. In section two, the concept "effectiveness" is discussed in particular. In section three, some models for measuring organizational effectiveness are reviewed.

### A. ORGANIZATIONS AS OPEN OR CLOSED SYSTEMS

In recent years, researchers have been interested in examinations of differences between schools. The focus has been on the various parts of the school as an organization, on the structure of schools as well as the individual and the group behaviour of organizational members.

The term "organization" has been defined in various ways by authors in the literature, but Steers (1981) summarizes quite well what these definitions have in common. He says:

> ...organizations are seen as collectivities of people working together for common goals. They are goal-setting systems in which individuals join together and coordinate their efforts to create a viable system capable of accomplishing common objectives (p.30).

The concept effectiveness underlies this definition of organizations. In other words, if an organization has a goal or a purpose, there are many ways of fulfilling these goals or purposes. Steers (1977) points out that it can be argued that the study of organizations and organizational behaviour in particular can be looked upon as an attempt to improve organizational effectiveness and efficiency (p.3). However, organizations can be studied from many different perspectives and every perspective provides its own insights and explanations to our understanding of how organizations work or function.

In a historical context, the framework or the concepts used in the early traditional approaches were based on the closed systems perspective. In the closed systems perspective the focus is on processes within organizations. The early efforts of Taylor, Fayol, Follett and Weber are all based on viewing organizations as closed systems. In this perspective, effectiveness is determined by the relationships between the administrative elements within the organization. Another broader approach, the open systems perspective, presents a way of understanding organizations, perceiving them as flexible both internally and externally (Mink et.al,1979 p.3). Viewing organizations as closed systems was seen as static and inflexible when dealing with the complex nature of organizations (Schein 1970, p.201). When organizations are viewed as open systems, the emphasis is on their structure and their environment. In other words, the organization is affected by what comes into it, what transpires inside it, and what comes out of it (Hall,1972 p.25). Katz and Kahn (1978) describe this process in more detail by saying:

> The functioning of any open system ... consists of recurrent cycles of input, transformation, and output. Of these three basic systemic processes, input and output are transactions involving the system and some sectors of its immediate environment; transformation or throughput is a process contained within the system itself (p.752-753).

A school is a typical example of an open system or organization. For example, the input to the school can be identified as students, personnel (e.g., teachers and administrators), materials (e.g., curricular supplies) and information (e.g., institutional and local expectations). The energy in the schooling process is the force that effects the throughput (the pupils) and the output can be the knowledge or the skills required (Herriott and Hodgkins,1973 p.88-89). Also, the flexibility of the open systems model allows definitions of sub-systems within a larger system so inputs in the larger model can become transformations in the subsystem or vice versa. The definition of boundaries of the organization depends therefore on the nature of the organization under study.

## The Open Systems Perspective Employed for this Study

In this study the concern was to examine the relationship between school attainment based on marks in four subject areas and some physical and administrative features (school variables, teacher variables) of comphrehensive primary schools in Iceland over the school years 1978-79 to 1981-82.

In this study schools are seen as open systems that are subject to change over the time period under investigation. The major terms of open systems theory, inputs and outputs, are used when dealing with the variables used and the school years under investigation can be viewed as the process part of the open systems model. Students are seen as inputs, and scores in the examinations seen as outputs affected by forces that act upon them. The measuring of forces in this study is delimited to selected teacher and school variables over a four year time period. Furthermore, since the open systems framework is broad and flexible it provided justification for using global measures of elements within schools, as well as treating each school as a whole (unit of analysis).

## B. THE NATURE OF THE CONCEPT OF ORGANIZATIONAL EFFECTIVENESS

Usually when talking about effectiveness we mean that something has effects in the direction we desire. It is, however, difficult to identify a criterion for organizational effectiveness. When studying schools as organizations a question such as "What exactly are schools supposed to produce and how can the outcomes be measured?" inevitably arises.

Schools have various functions in different societies and also within the same society. Averch et.al. (1974) say that in the U.S., public schools have been viewed as carrying out five important functions:

(1)socialization
(2)sorting
(3)custody
(4)knowledge and skills training
(5)creativity and self reliance (p.3)

A major theme in educational research is the search for evidence of differences in school outcomes or effectiveness in achieving their goals. This evidence might be found within every one of the five functions.

Criteria for organizational effectiveness can also be judged by gathering data from other sources, such as the educator, school buildings, school districts, finance, and instruction (Hoy and Miskel p. 325).

The measurement of school outcomes is, however, of critical concern. In the first place, the measurement itself is problematic. Furthermore, the concept dealt with is a hypothetical construct with no clear referent in the physical world. School attainment or effectiveness, are intellectual constructs referring to the relationships between the various factors. Although, the concept itself exists only in our minds, we can agree on some operational measures (Mouly 1978 p.31 and Hoy and Miskel 1982 p.326).

Hoy and Miskel (1982) describe the term effectiveness as a multidimensional concept. In other words, almost every phase, process or outcome can be used as an indicator of how effective an organization is (p.326). Steers (1977) points out that the most widely used evaluation criteria when dealing with effectiveness include "(1) adaptability -flexibility, (2) productivity, (3) job satisfaction, (4) profitability, (5) resource acquisition" (p.175). In other words, which factors are taken into account when deciding upon effectiveness criteria depends on the focus and the nature of each individual study as well as the access to data resources.

**Reliability vs. Validity**

Mere agreement alone on the concept of effectiveness as a multidimentional concept is not sufficient. All measures or tests used when measuring effectiveness should be reliable and valid. "Reliability" means that the test has to be consistent, giving the same scores for the same person or organization when tested on two or more occasions. On the other hand, "validity" refers to what the measurement really measures. (Bridge et.al.,1979 p.35-39, and Mouly,1978 p.74-76) Dealing with constructs and deciding measurement validity is a very difficult and critical process. Bridge et.al. (1979) describe and summarize several kinds of validity which apply to all measures in general:

> Face validity, ... means that the content of the test "looks" like it ought to measure the concept in question....
> Criterion-related validity involves correlating test scores with another known measure of the same behavior; this second measure is referred to as the criterion measure. Predictive validity is the most important kind of criterion-related validity; that is a good test will accurately predict future behavior that is designed in theory to measure....
> The item validity of particular questions within a single test may be estimated by another kind of

> criterion-related validity. In this case the criterion is the total score on the test, and the individual test items are correlated with this score, one at a time.....
> The construct validity of a measure is inferred from the pattern of relationships between the test and many other constructs or known facts about behavior. For example, the concept of "intelligence" has been operationally defined by a number of "IQ tests". To have construct validity, the IQ test must not only be correlated with other purported measures of intelligence, but it must also be correlated with behaviors that are supposedly related to intelligence (p.38).

Thus, while what is used as an indicator for effectiveness is a matter of agreement between researchers, the measures must be as reliable and valid as possible.

## Effectiveness vs. Efficiency

The terms organizational effectiveness and organizational efficiency appear often in the literature on organizations. However, efficiency is usually seen as the "way in which the resources of an organization are arranged" (Becker and Neuhauser, 1975 p.39), usually so that the return is as profitable as possible. In other words, when pursuing organizational goals, the efficiency of the organization is the "cost/benefit ratio" (Steers, 1981 p.43). From the systems perspective, efficiency is usually measured as the ratio of inputs which have been agreed on as compared to agreed on outputs. Some authors (Katz and Kahn, 1978 p.226) argue that efficiency is a part of the effectiveness construct. Steers (1977) points out that these constructs can be related, depending upon which variables are used to define them (p.51). Consequently these two concepts can be related although they are not identical. As discussed earlier,one possible relationship between the concepts lies in their nature as constructs.

## C. THEORETICAL MODELS WHEN MEASURING ORGANIZATIONAL EFFECTIVENESS

The well being of a society is to a large extent determined by how well its organizations carry out their tasks. For various reasons, the importance of the construct effectiveness within the school system seems to be increasing. Some, however, suggest that school effectiveness cannot be defined and measured. (see Hoy and Miskel,1982 p.319).

Although the concept effectiveness is by its nature problematic, there is, however, no theoretical difference between effectiveness when dealing with schools as organizations and any other organizations. Once agreement is reached upon the definition and measurement of school effectiveness it is possible to start researching differences in school achievement and try to explain different degrees of success. Robinson (1981) says that although schools are familiar objects to everyone, the ability to explain and generalize how they work is severely limited (p.134). In other words, Robinson is saying that a generally accepted theory of schools as organizations is not available.

Organizations can, however, be viewed from various theoretical perspectives. Hoy and Miskel (1982) state that there are two main theoretical models, the goal model and the system resource model which provide the basis for working with school effectiveness.

### The Goal Model

All organizations are engaged in activities of one sort or another. Those activities constitute some level of goal attainment or effectiveness (Hall,1972 p.79). Etzioni (1964) says that "an organizational goal is a desired state of affairs which the organization attempts to realize" (p.6), and Price (1968) agrees on this by saying that effectiveness is "the degree of goal attainment" (p.3).

The nature of the goals of an organization can vary. Some organizations may have concrete and limited goals while those of other organizations are of a more ambiguous nature. The nature of stated goals can also be ambiguous. For example, the general goals of the Icelandic Comprehensive Primary School System are clearly stated in the legislation and the curriculum guides, although the nature of goals themselves is subjective and idealistic and therefore difficult to operationalize and deal with objectively. Hoy and Miskel (1982) point out that there are three common types of organizational goals: official goals which "are formal statements of purpose", operative goals which "are the true intentions" of an organization, and operational goals that "carry with them approved criteria and evaluation procedures" (p.321). One problem with the classification of organizational goals is that categories are broad and general. Also, there can be some overlap between the categories. For example, a formal purpose of an organization might also be classified as the true intention of the organization.

**The System Resource Model**

The system resource model attempts to avoid some of the problems involved in using the goal model. The major argument is that the determination of goals is extremely difficult. For example, in large organizations it is difficult to define a small number of goals for the organization as a whole. The organization can be composed of many sub-units that all have their own goals that are not necessarily clearly related to one another. However, in the systems resource model, which is based on the open systems perspective, effectiveness is defined by Hoy and Miskel(1982) as:

> the organization's ability to secure an advantageous bargaining position in its environment and to capitalize on that position to acquire scarce and valued resources (p.322).

According to this model, an organization is in constant interaction with its environment. It must emphasize adaptive functions for being effective or as Hoy and Miskel (1982) put it:

> ...effective organizations are those with sensitive monitoring mechanisms that provide information about new behaviour that can lead to the acquisition of more assets (p.323).

In educational organizations the system resource model has been criticized for various reasons. For example, an educational organization which is fighting declining student enrollments can put all its efforts and emphasis on recruitment of students. The quality of instruction which may be the cause of the decline in enrollment, is here forgotten. Consequently, too much emphasis on some inputs can have damaging effects on some outputs (Hoy and Miskel,1982 p.324). Another major criticism is that the system resource model is actually a goal model. For example, the fight against decline in student enrollment can be looked upon as an operative goal which means that the two models may not be so very different (Hoy and Miskel,1982 p.324).

**Discussion**

Hall (1972) does not perceive these two models as differing markedly. Furthermore he says, "the issue of goals versus resource allocation is ... in many ways an argument over semantics" (p.100). For example, the acquisition of resources from the environment is based on the general official goals of the organization. "The acquisition of resources does not just happen" (Hall, 1972 P.100), there are always goals of one sort of another. Hoy and Miskel

(1982) say in this context that there have been attempts to combine the two models, and all of those attempts indicate that the use of goals cannot be avoided (p.324). However, the main difference may be how rigorous the goals are. Whereas in the systems resource model the goals are dynamic and diverse, in the goal model they are static (Hoy and Miskel,1982 p.324). Hoy and Miskel (1982) point out and add to the discussion of these two models that time is a necessary dimension when dealing with effectiveness. For example, some days or parts of the school year are better or worse than others when measuring school effectiveness. Time is a component of both the goal model and the systems resource model. Therefore every attempt to measure effectiveness is dependent upon time, but what time or days are selected as the unit of analysis depends on the organization under examination, its structure and operation in general. Another important factor they discuss is that criteria for effectiveness are always a reflection of the biases of the interest groups involved (p.325). Hence, the flexible nature of the construct allows the use of outcome measures (outputs) like school examinations as indicators for differences in school attainment. Although these exams were designed for measuring achievement levels of individual students they can, however, be used for discriminating between larger units, like schools and regions. In this context the problem of validity, or what the exams really measure, is of concern. For example, are we measuring differences between students or are we measuring differences between instructional personnel? Of course there is no simple answer to this question, but for practical reasons we can agree that exams of this nature usually have high face validity, which means that they measure some skills that are considered basic to the task of schools. Despite the fact that the aims of the primary educational system are rather open and idealistic, the curriculum guides give more rigorous guidelines or goals to be fulfilled. Both because the guidelines in the curriculum guides are clearly stated and because most teachers arrange their teaching for those exams (Baldursson,1983 chap. III), it can be argued that the exam scores offer a valid basis for discriminating between school attainment levels.

## D. Summary

The chapter opened with a discussion of the conceptual framework for this study. The first section of the chapter dealt with organizations as open or closed systems. Then, it was shown that the framework employed in this study uses some concepts of systems theory. In the second section of the chapter, the nature of the effectiveness construct was discussed. It was shown that the concept is a multidimensional concept and the argument that it can be a part of the efficiency concept was presented. In the third section the goal model and the systems resource model were discussed. It was argued that the difference between these two models is not great. In the discussion it was stated that the curriculum guide goals for each subject are clearly outlined and that teachers arrange their teaching with these exams in mind. This means that the exam scores offer a supportable basis for measuring differences in school attainment.

In general, by employing the open system perspective for describing the schooling process, students are seen as inputs. Scores in the examinations are seen as outputs affected by forces that act upon them. Schools are viewed as organizations concentrating on fulfilling their official and operative goals.

# Chapter IV

## RELATED RESEARCH

The belief that the characteristics of a given school influence academic success or students' attainment has been common among researchers. Most people think that schools should provide training for students to prepare them for participating in a society which is becoming more and more complicated. The impact of schooling is therefore not only limited to cognitive development. It implies values and attitudes that are perceived to be of profit for students in the occupational and political world of adults. This implies that the impact of schools is dependent upon facilities, staff, programs offered, or in general, the quality or quantity of resources that are made available to students in the schooling process. The issue is therefore as Spady (1973) states it, "do measurable differences in the characteristics of schools lead to measurable differences in student outcomes?"(p.135).

In most of the studies reviewed, the student or the school are the units of analysis. Most of the studies use some concepts of systems theory, like input or output, and the analytic levels can be from the various parts of the system (school) or its environment. The studies reviewed are mainly from the U.S. and the ones that are from elsewhere will be identified.

## A. REVIEWS OF SOME EMPIRICAL STUDIES

The so-called Coleman Report, or just the Report, officially called The Equality of Educational Opportunity, was a major study on differences in student achievement in the U.S.. The major purpose of this study was to find out whether achievement was due to differences within schools or to differences between schools. Their analysis (Coleman et al.,1966) indicated that most of the variations in student achievement were not due to differences between schools, but rather to variations within schools. The major factor or variable of the "within factors" which accounted for differences in achievement was the students' family background. As stated in the Report:

> ...schools bring little influence to bear on a child's achievement that is independent of his background and general social context... (p. 325)

Other factors, like school facilities and programs, did not account for differences in student achievement. This result was unexpected and as Bridge et al. (1979) put it, a "highly disturbing conclusion"(p.174). The following seven statements are the findings in the Coleman Report summarized by Bridge et al. (1979):

> (1) Family background has a great impact on achievement
>
> (2) The importance of family background factors does not diminish as the child progresses through the grades
>
> (3) Most of the variance in achievement is due to differences within schools rather than between schools, and most of the between-school variance is accounted for by individual student attitudes.

> (4)School facilities and curriculum account for very little of the between-school variance in academic achievement.
>
> (5)Although neither teacher nor school inputs account for much variance in achievement, teacher factors are somewhat more important sources of variance than school factors.
>
> (6)Student body characteristics account for more variance in achievement than either school or teacher characteristics do.
>
> (7) Certain student attitudes, notably self-concept and sense of control over the environment, are highly related to academic achievement (p.175-176).

These findings have been criticized on the basis of the methodology and statistical analysis used. However, they stimulated further research in the area and some researchers reanalysed the huge amount of data provided in the Coleman study.

Mayeske and his co-workers belong to that body of researchers who reanalyzed the Coleman data. Their studies have been published in several reports from the years 1972-1975, and although their analysis is more detailed than in the Coleman study, their findings are more or less the same (Bridge et al.,1979 p.186). For example, in the study called A Study of the Achievement of Our Nation's Students, Mayeske et al. (1973) concluded that:

> ...it was not so much the mere presence or absence of key family members that affected a child's achievement level as it was the expectations and aspirations that parents or parental surrogates had for the child and the supporting activities in which they engaged (p.140).

In other words, family factors, especially aspiration of parents, contribute more to achievement than school factors do.

Jencks et al. (1972) in their reanalysis of the Coleman data in the book Inequality: A Reassessment of the Effect of Family and Schooling in America, confirmed the findings in the other studies mentioned, by saying that "the most important determinant of educational attainment is family background"(p.159). Furthermore, they said that "qualitative differences between high schools seem to explain about 2 percent of the variation in students' educational attainment" (p.159). All these studies indicate that schools have rather modest effects on student attainment. The variable background of students explains better the attainment difference between students than other variables used.

There can be various reasons for differences and Jencks et al. (1972) pointed out five possibilities:

> (1)They [the students] are more likely to have a home environment in which they acquire the intellectual skills they need to do well in school.
>
> (2) They are likely to have genes that facilitate sucess in school.
>
> (3) They seldom have to work or borrow money to attend college.
>
> (4) They may feel that they ought to stay in school, even if they have no special aptitude for academic work and dislike school life.
>
> (5) They may attend better schools, which induce them to go to college rather than to drop out (p.138).

The reanalysis of Bowles and Lewin (1968) showed on the other hand that "school resources" make more difference than indicated in the Coleman Report. Their analysis is based on radical criticism of the methodology and statistical techniques employed by Coleman and coworkers. By restructuring parts of the data and by using more sophisticated statistical techniques, their findings in general moderate student background factors as determinants of scholastic achievement and consolidate school resources (p. 13). Rutter et al.(1979) point out that in these classical studies in the U.S., internal life of schools was ignored and other studies indicate the importance of the internal characteristics of schools (p.5). Without judging the validity of this, probably both the students' background and the environment in the school have some effect on their achievement. Wiley (1976) in his study on the effects of quantity of schooling, found that a "24% increase in the quantity of schooling...[resulted] in 65% increase in reading comphrension" (p.263). Although this study as the others can be criticized on a methodological basis, Wiley makes the point that in all the classical studies the "general and basic source of school effects, such as quantity of schooling, was neglected" (p.264).

Wiesman (1964) reported on school size that the distributions "tend to be U-shaped, i.e., the highest attainment is found in medium-sized schools with an enrollment of 250-300 pupils" (p.109). Bidwell and Kasarda (1975) in their study on School District Organization and Student Achievement concluded that neither school district size nor school size were related to student achievement (p.69).

Summers and Wolfe (1977) found, on the other hand, that smaller schools appeared to have greater achievement (p.645). This study by Wolfe and Summers is of interest in many ways, especially because the data used were longitudinal in nature (p.641). Their major concluding remarks are that the conditions within the school account for more than had been found in earlier studies. For example, many school inputs mattered, but their impact varied on different types of students (disadvantaged, blacks etc.) and above average students benefitted more from experienced teachers than below average students did (p.644-647).

The study done by Rutter et.al. in Britain, is a fairly recent study. It was a long term study identifying the factors that affected school outcomes in 12 secondary schools in London. The results from the study indicate that differences in what they termed "school ethos" best described differences in school outcomes (p.177-9). School ethos is the climate of expectations and group norms or modes of behaving for groups as a whole (p.183-184). The differences in the four outcome measures; (1) attendance, (2) behaviour (such as skipping lessons, damage to school property etc.),(3) delinquency among boys, and (4) attainment in school examinations, were not associated with the size of the schools, the quality of the buildings, or class sizes (p.95-105).

Bjornson and Edelstein (1977), in their study on social inequality and stratification in Iceland, found in education that occupational class of father was strongly related to students' grades in the primary school system. On the scale of 1 to 6, from unskilled manual workers (1) to academic professionals (6), the relationship was strong between class 6 and high grades and strong between class 1 and low grades. Bjornson and Edelstein also found that at the end of the primary school, the relationship was stronger between father's occupational class and student attainment than in the earlier grades. Furthermore, they examined class patterns of child rearing. Their major findings were that classes 1 and 6 almost showed reversal tendencies where class 6 had high aspirations, warmth and permissiveness, but class 1 on the other hand had low aspirations and warmth but high coldness and detachment from their children (p.132-133). These findings suggest, in other words, that the socio-economic background of students accounts increasingly for grades as they grow older, and that some parental behaviour patterns are strongly associated with their children's attainment. However, these findings can be criticized on the basis that the examinations used were not the same for every student in their sample, which was only drawn in the capital city, Reykjavik. A stratified sample of this nature also limits the generalizability of the findings. On the other hand, if the findings show the reality, an interesting question is what function the schools play in this process?

Thorlindsssson and Bjornsson (1979) in a study called "Some Determinants of Scholastic Performance in Urban Iceland", found that I.Q. was the best single predictor of scholastic performance. On the other hand, by controlling the other independent variables, the influence of I.Q. on scholastic performance was reduced considerably. Social variables as a whole accounted for 41% of the variation in the outcome measures, but by adding I.Q. in the equation, the variation accounted for increased by 20% bringing the total to 60%.

## B. SUMMARY AND CONCLUSIONS

Only a few studies on school attainment have been reviewed in this chapter. The findings of the studies vary although it seems to be that in the older studies the school accounts less for student attainment than in the newer ones. There are many ways to explain these differences. For example, from a methodological point of view, one of the major problems in the research on school effectiveness or the attainment of students is to control school input so the differences can be considered the effects of the schools themselves. How intake is controlled varies between studies. However, Gray (1981) points out, that it is very difficult to compare studies of this nature because the tests used as criteria vary, the school levels are different, and it is also difficult to compare cross-national studies (p.26). This literature review indicates, nevertheless, that the expected relationship between the variables used in this study and school attainment would not be very strong, except for those variables that are related to family background.

## Chapter V

## RESEARCH DESIGN AND METHODOLOGY

In this chapter, research design is discussed in terms of the nature of the study, the problem, the ojectives and the sub-problems. Methodology is discussed in terms of the selection of the sample, data collection procedures, and statistical treatment of the data.

### A. The Nature of the Study

The study undertaken in this research project can be labelled as a school survey. The unit of analysis in this survey is the individual school including grade nine, and the survey is longitudinal in nature. Mouly (1978) describes the major purpose of a school survey by saying that "it serves to reduce the gap between goals and accomplishments and [it] helps to raise the standards of educational practice" (p. 230). Furthermore the study was intended to be both descriptive and exploratory. Selltiz et al. (1959) state that descriptive studies are to "... portray accurately the characteristics of a particular individual, situation or group...[and]... to determine the frequency with which something occurs or with which it is associated with something else..." (p.50). On the other hand, in exploratory studies, "the major emphasis is on discovery of ideas and insights" (Selltiz et al., 1959 p. 50). The study undertaken in this research project is descriptive in that it provides a description of some teacher and school variables over a four year period by using statistics such as means and frequencies. The exploratory part of the study is that it is intended to gain new insights into factors that might be related to or acount for differences in school attainment. Regression and correlation analysis are seen as exploratory statistical techniques.

## B. The Nature of the Variables

The independent variables in most research surveys of this nature are usually called proxy variables. Proxy variables substitute for important variables not measured. Bridge et al. (1979) say in this context:

> Strictly speaking, almost all of the variables used in input-output studies are proxies because researchers do not have a clear understanding of the process underlying the relationships they uncover (p.27).

Studies like these are, in other words, difficult to interpret. The use of proxy variables in exploratory studies has, however, practical significance, guiding and formulating research problems for further investigation.

The variables used in this research project are all proxy variables.

## C. The Problem and Its Sub-Problems

By employing the open systems perspective or model for describing the schooling process, students can be seen as inputs, and scores in the examinations seen as outputs affected by forces that act upon them (the transformation process). The data available for this study were limited to school variables, teacher variables and student marks. The marks were seen as indicators of outputs. No data were available to the researcher on students as inputs. By assuming that student I.Q. is randomly distributed, the independent variables can be related to the outputs.

### The Problem

The research problem was to examine the relationship between school attainment based on school average scores on the comprehensive school examinations and selected physical and administrative features (school variables and teacher variables) of comprehensive primary schools in Iceland.

### Objectives and Sub-Problems

The first objective of the study was to search for patterns in school attainment by analyzing comprehensive primary school scores for the school years 1978-79 to 1981-82. Hence, the following sub-problems were investigated:

1. What relationship exists between school average scores in the four subjects (Icelandic, English, Danish, Mathematics) within each school year?

2. What relationship exists between school average scores in each subject during the school years under study?

The second objective was to examine the relationship between selected teacher and school variables and school attainment (school average scores) during the school years 1978-79 to 1981-82. The following sub-problems were investigated:

1. Which of the teacher or school variables are the best predictors of school average scores for each subject during all the four school years under study?

2. Which of the teacher or school variables are the best predictors of school average scores for each subject within each school year under study?

## D. Selection of the Sample

The total population of comprehensive primary schools in Iceland was in 1978-79 213 schools, in 1979-80 212 schools, in 1980-81 214 schools, and in 1981-82 212 schools.

The population for this study were all comprehensive primary schools with grade nine. However, some of the schools in this population were not considered representative of a regular comprehensive primary school, so it was decided not to include them in the study. The schools which were left out of the sample, were schools that especially selected students in one way or another. In one of the schools students were selected according to previous marks while another is a special school for adults. Some of the others are delinquency institutions or institutions for handicapped children that have been authorized to administer grade nine. One of the schools was run by a religious group and one regular school was left out in 1980-81 and 1981-82 because of changes in the school that did not allow any comparison between years.

The sample for this study is presented in Table 2. The variation in number of schools between years is because of five reasons. Where there is an increase in number of schools, either new schools have been established with grade nine, or some existing comprehensive primary schools have added grade nine to their classes. On the other hand, where there is a decrease in number of schools, either the schools have been closed down, discontinued with grade nine or in some instances the schools have been changed into comprehensive secondary schools.

### E. Data Collection Procedures

Permission to use outcomes (marks) on the comprehensive primary school examinations was obtained from the Ministry of Culture and Education in Iceland. All the other statistical records were found in official documents provided by the Ministry. The records were in the form of staff lists (principal and teachers) and statistical records on classes for individual schools. As previously stated, each school was treated as a whole, and the variables used were on every teacher holding tenure in every school, despite what grade levels he or she taught. Partly, this was done because there was no information on the staff lists

Table 2

Distribution of Schools in Sample, by Regions,
During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| Capital - Reykjavik | 12 | 15.38 | 11 | 13.92 | 13 | 15.29 | 16 | 17.78 |
| South-West Region | 9 | 11.54 | 9 | 11.39 | 11 | 12.94 | 12 | 13.33 |
| West Region | 10 | 12.82 | 9 | 11.39 | 9 | 10.59 | 10 | 11.11 |
| West-Peninsula Region | 7 | 8.97 | 7 | 8.86 | 7 | 8.24 | 7 | 7.78 |
| North-West Region | 7 | 8.97 | 8 | 10.13 | 8 | 9.41 | 8 | 8.89 |
| North-East Region | 11 | 14.10 | 11 | 13.92 | 13 | 15.29 | 13 | 14.44 |
| East Region | 10 | 12.82 | 10 | 12.66 | 11 | 12.94 | 11 | 12.22 |
| South Region | 12 | 15.38 | 14 | 17.72 | 13 | 15.29 | 13 | 14.44 |
| Total | 78 | 100.00 | 79 | 100.00 | 85 | 100.00 | 90 | 100.00 |

respecting the grade level taught. The data on the staff lists were limited to teachers with tenure, so no information was obtained on temporary part time teachers. However, some of these statistics could be used directly except for cases when the information had to be classified and precoded for making frequency tables. Age of both male and female principals and teachers had to be transformed from birth year to actual age. This was done for each year independently. The scale used for classifying males and females by age was 20 years old or younger, 21-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, 56-60, 61-65, and 66 and older. The same scale was used for classifying principals by age.

Teaching experience was indicated in the records by the year each teacher had started permanent employment with the government. For example, if a teacher had worked for the Government from the year 1950 to 1960 and then quit his job as a teacher for ten years and started again in 1970, he would have work experience from 1960 instead of 1950. This information was transferred or pre-coded in a similar manner as was done with the age of teachers and principals except that the scale used ran from no-experience on a one year interval, to 50 years of experience. This information was in the form of years employed by the Government. Hence, if a teacher had been employed by the Government for something else than teaching, it counts as working experience and is included on the records used for this study. However, in this context the assumption was made that this factor was not significant for this study. In the first place it is likely that this factor is randomly distributed, and secondly it was judged the instances would be small in number.

On the staff list records, position types were indicated for individual teachers so that the numbers of male and female teachers had to be counted and pre-coded for each school.

The number of new teachers, male and female, was obtained by comparing the staff lists between years. Unfortunately no staff list was available for the school year 1977-78 so no information on new teachers was obtained for that year. The same procedure was followed for information on whether the principal was the same as the year before. Teachers on leave were in general left out in the coding process except that when a teacher returned, he or she was not coded as a new teacher in the school. On the other hand, a principal's return was coded as a separate variable.

As stated earlier, the other variables could be used directly.

## F. Description of the Sample

As indicated earlier, the sample for this study was chosen for a number of reasons. An additional reason is that the researcher was born and raised in Iceland and was a teacher within the K-9 educational system for some years, making him in many respects familiar with the system under study. The sample can in fact be considered to be the total population of schools that do not especially select their clientele.

## School Variables

Tables 3 through 15 provide a description of schools in the sample in terms of the variables used.

The information in Table 3 indicates the distribution of schools in the sample by geographcial location during the school years 1978-79 to 1981-82. The increase in number of schools with grade nine seems to be mainly in Greater Reykjavik with the decrease in towns. The number of schools in villages and hamlets seems to be rather stable. The schools in Reykjavik and neighborhood towns are approximately 23% in 1978-79 and 27% in 1981-82 of the total number of schools for each year. In towns they are 33% in 1978-79 and 28% in 1981-82, in villages 14% in 1978-79 and 12% in1981-82, and in hamlets 29% in 1978-79 and 31% in 1981-82.

The distribution of schools by school type in Table 4 shows that the number of boarding schools and the number of boarding/regular schools are almost the same over the years 1978-79 to 1981-82. On the other hand, there has been an increase in regular schools, for example there was a 7% increase between 1980-81 and 1981-82.

### Table 3

### Distribution of Schools in Sample, by Geographical Location, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| Reykjavik Inner City | 10 | 12.82 | 9 | 11.39 | 9 | 10.59 | 10 | 11.11 |
| Reykjavik Suburban | 2 | 2.56 | 2 | 2.53 | 4 | 4.71 | 6 | 6.67 |
| Reykjavik Neighborhood | 6 | 7.69 | 6 | 7.59 | 8 | 9.41 | 9 | 10.00 |
| Akureyri | 2 | 2.56 | 2 | 2.53 | 3 | 3.53 | 3 | 3.33 |
| Towns - coastal | 21 | 26.92 | 21 | 26.58 | 20 | 23.53 | 20 | 22.22 |
| Towns - rural | 3 | 3.85 | 3 | 3.80 | 3 | 3.53 | 3 | 3.33 |
| Villages - coastal | 9 | 11.54 | 10 | 12.66 | 9 | 10.59 | 9 | 10.00 |
| Villages - rural | 2 | 2.56 | 2 | 2.53 | 2 | 2.35 | 2 | 2.22 |
| Hamlets - coastal | 3 | 3.85 | 4 | 5.06 | 6 | 7.06 | 6 | 6.67 |
| Hamlets - rural | 20 | 25.64 | 20 | 25.32 | 21 | 24.71 | 22 | 24.44 |
| Total | 78 | 100.00 | 79 | 100.00 | 85 | 100.00 | 90 | 100.00 |

Table 4

Distribution of Schools in Sample, by School Type,
During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| Boarding schools | 9 | 11.54 | 9 | 11.39 | 9 | 10.59 | 9 | 10.00 |
| Regular/Boarding schools | 10 | 12.82 | 11 | 13.92 | 11 | 12.94 | 11 | 12.22 |
| Regular schools | 59 | 75.64 | 59 | 74.68 | 65 | 76.47 | 70 | 77.78 |
| Total | 78 | 100.00 | 79 | 100.00 | 85 | 100.00 | 90 | 100.00 |

The data in Table 5 show the number of schools by number of grades in schools. The number of schools with grades 6/7 to 9, 8 to 9 or just grade 9 is rather stable with comparison to the number of schools with grades 1 to 9. The increase in number of schools in the sample with grades 1 to 9 from 1978-79 to 1981-82 is approximately 18%.

The operating time of schools is shown in Table 6. The number of schools operating for 8 1/2 months seems to be declining, but both the number of schools operating for 8 months and 9 months is increasing. Generally speaking, it can be said that the 8 month schools operate in villages and hamlets, but the 9 month schools in larger towns.

School size, determined by number of students in each school is indicated in Table 7. Of the total number of schools in 1978-79, schools with 200 students or less are approximately 63%, but 56% in 1981-82. Schools with 201 to 500 students, however, are appproximately 28% in 1978-79 but appproximately 32% in 1981-82, and schools with more than 501 students are approximately 9% in 1978-79 but 12% in 1981-82. The major increase in number of schools from 1978-79 to 1981-82 seems to be mainly among the relatively small schools with 51-100 students, the medium sized schools with 301-500 students, and the large schools with 800 students or more. Schools with the size of 151-200 students are the only ones that seem to be decreasing in number over the time period under study.

## Table 5

Distribution of Schools in Sample, by Grade Levels Offered in School,
During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| Grades 1 - 9 | 44 | 56.41 | 47 | 59.49 | 54 | 63.53 | 60 | 66.67 |
| Grades 6 - 9 and 7 - 9 | 25 | 32.05 | 23 | 29.11 | 23 | 27.06 | 23 | 25.56 |
| Grades 8 - 9 and 9 | 9 | 11.54 | 9 | 11.39 | 8 | 9.41 | 7 | 7.78 |
| Total | 78 | 100.00 | 79 | 100.00 | 85 | 100.00 | 90 | 100.00 |

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### Table 6

Distribution of Schools in Sample, by School Operating Time,
During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| 8 months | 42 | 53.85 | 44 | 55.70 | 46 | 54.12 | 47 | 52.22 |
| 8 1/2 months | 5 | 6.41 | 5 | 6.33 | 4 | 4.71 | 4 | 4.44 |
| 9 months | 31 | 39.74 | 30 | 37.97 | 35 | 41.18 | 39 | 43.33 |
| Total | 78 | 100.00 | 79 | 100.00 | 85 | 100.00 | 90 | 100.00 |

### Table 7

Distribution of Schools in Sample, by School Size, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| up to 50 students | 3 | 3.85 | 4 | 5.06 | 1 | 1.18 | 3 | 3.33 |
| 51 - 100 students | 14 | 17.95 | 14 | 17.72 | 22 | 25.88 | 20 | 22.22 |
| 101 - 150 students | 19 | 24.36 | 19 | 24.05 | 19 | 22.35 | 19 | 21.11 |
| 151 - 200 students | 13 | 16.67 | 13 | 16.46 | 10 | 11.76 | 8 | 8.89 |
| 201 - 300 students | 11 | 14.10 | 11 | 13.92 | 10 | 11.76 | 14 | 15.56 |
| 301 - 500 students | 11 | 14.10 | 12 | 15.19 | 15 | 17.65 | 15 | 16.67 |
| 501 - 800 students | 6 | 7.69 | 5 | 6.33 | 6 | 7.06 | 6 | 6.67 |
| over 800 students | 1 | 1.28 | 1 | 1.27 | 2 | 2.35 | 5 | 5.56 |
| Total | 78 | 100.00 | 79 | 100.00 | 85 | 100.00 | 90 | 100.00 |

In Tables 8 and 9 the distribution of occupational status or position type is outlined for male and female teachers. As shown in Table 8, relatively few male teachers hold 2/3 or half time positions. The majority of male teachers hold full time positions and there is a 10% increase in full time male teachers from 1978-79 to 1981-82. When it comes to the female teachers, however, the picture is altogether different. As Table 9 shows, a considerable number of female teachers holds part time positions (2/3 and half time). In 1978-79, the number of full time female teachers compared to part time female teachers is almost the same. Approximately 40% of the total number of female teachers in 1981-82, held full time positions, whereas approximately 60% held part time positions. A comparison of the years 1978-79 to 1981-82 shows approximately 18% increase in full time positions, 38% increase in 2/3 time positions, and 50% increase in half time positions held by female teachers.

## Teacher Variables

In Table 10 the distribution of age and sex of male and female principals is outlined. As shown in Table 10 the principal profession is dominated by males and the increase from 1978-79 to 1981-82 is restricted to males. In 1978-79, approximately 65% of the male principals were in the age group 31-50

Table 8

Distribution of Male Teachers in Sample, by Positions, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| full - time | 522 | 87.88 | 521 | 87.71 | 553 | 87.36 | 580 | 88.28 |
| 2/3 time | 23 | 3.87 | 17 | 2.86 | 26 | 4.11 | 21 | 3.20 |
| half - time | 49 | 8.25 | 56 | 9.43 | 54 | 8.53 | 56 | 8.52 |
| Total | 594 | 100.00 | 594 | 100.00 | 633 | 100.00 | 657 | 100.00 |

Table 9

Distribution of Female Teachers in Sample, by Positions, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| full - time | 260 | 48.96 | 230 | 42.99 | 282 | 42.60 | 317 | 39.09 |
| 2/3 time | 125 | 23.54 | 139 | 25.98 | 165 | 24.92 | 200 | 24.66 |
| half - time | 146 | 27.50 | 166 | 31.03 | 215 | 32.48 | 294 | 36.25 |
| Total | 531 | 100.00 | 535 | 100.00 | 662 | 100.00 | 811 | 100.00 |

### Table 10

### Distribution of Male and Female Principals, by Age, During the School Years 1978-79 to 1981-82

| | 1978-79 | | | | 1979-80 | | | | 1980-81 | | | | 1981-82 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | | Male | | Female | | Male | | Female | |
| | f | % | f | % | f | % | f | % | f | % | f | % | f | % | f | % |
| 20 or younger | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 21 - 25 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| 26 - 30 | 6 | 8.00 | 1 | 33.33 | 6 | 7.89 | 1 | 33.33 | 6 | 7.14 | 0 | 0.0 | 3 | 3.45 | 0 | 0.0 |
| 31 - 35 | 14 | 18.67 | 1 | 33.33 | 13 | 17.11 | 0 | 0.0 | 19 | 22.62 | 0 | 0.0 | 18 | 20.69 | 0 | 0.0 |
| 36 - 40 | 12 | 16.00 | 0 | 0.0 | 15 | 19.74 | 1 | 33.33 | 13 | 15.48 | 0 | 0.0 | 16 | 18.39 | 1 | 33.33 |
| 41 - 45 | 13 | 17.33 | 1 | 33.33 | 6 | 7.89 | 1 | 33.33 | 9 | 10.71 | 0 | 0.0 | 11 | 12.64 | 0 | 0.0 |
| 46 - 50 | 10 | 13.33 | 0 | 0.0 | 18 | 23.68 | 0 | 0.0 | 19 | 22.62 | 1 | 100.00 | 24 | 27.59 | 1 | 33.33 |
| 51 - 55 | 9 | 12.00 | 0 | 0.0 | 8 | 10.53 | 0 | 0.0 | 8 | 9.52 | 0 | 0.0 | 8 | 9.20 | 0 | 0.0 |
| 56 - 60 | 5 | 6.67 | 0 | 0.0 | 3 | 3.95 | 0 | 0.0 | 4 | 4.76 | 0 | 0.0 | 5 | 5.75 | 1 | 33.33 |
| 61 - 65 | 6 | 8.00 | 0 | 0.0 | 6 | 7.89 | 0 | 0.0 | 4 | 4.76 | 0 | 0.0 | 2 | 2.30 | 0 | 0.0 |
| 66 or older | 0 | 0.0 | 0 | 0.0 | 1 | 1.32 | 0 | 0.0 | 2 | 2.38 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Total | 75 | 100.00 | 3 | 100.00 | 76 | 100.00 | 3 | 100.00 | 84 | 100.00 | 1 | 100.00 | 87 | 100.00 | 3 | 100.00 |

years old and 26% were over fifty years of age. In 1981-82, however, 80% of principals were in the 31-50 years age group, and 15% were over 50 years old. The table shows relatively few "young" and "old" principals.

The distribution of male teachers by age is shown in Table 11, and of females in Table 12. Approximately 65% of the male teachers are between 21 and 40 years of age in 1978-79 and 1981-82. The number of male teachers in the age group 41-60 years old is also rather stable, approximately 28% in 1978-79 as well as 1981-82. As shown in Table 12, the distribution of age among female teachers is similar to that of the males. Approximately 66% of the female teachers are in the 21-40 years age group in 1978-79 and 1981-82. The 41-60 years age group is similar for both male and female teachers, approximately 28% in 1978-79 and 1981-82. The age group 20 years old or younger, both male and female very likely consist of people without teaching certificates. As Table 11 and Table 12 show, there seems to be a slight decrease rather than increase in the number of both males and females in this age group.

The information in Table 13 and Table 14 is on male and female teaching experience. As Table 13 shows, the number of male teachers with no teaching experience is approximately 7% to 8% of the total number of teachers each year. The year 1980-81 is an exception, however, with 12% of the male teachers with no teaching experience. The number of male teachers with 1-4 years experience in teaching is 27%

Table 11

Distribution of Male Teachers in Sample, by Age, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| 20 or younger | 13 | 2.19 | 8 | 1.35 | 9 | 1.42 | 8 | 1.22 |
| 21 - 25 | 70 | 11.78 | 59 | 9.93 | 68 | 10.74 | 53 | 8.07 |
| 26 - 30 | 164 | 27.61 | 182 | 30.64 | 174 | 27.49 | 164 | 24.96 |
| 31 - 35 | 88 | 14.81 | 89 | 14.98 | 110 | 17.38 | 132 | 20.09 |
| 36 - 40 | 68 | 11.45 | 63 | 10.61 | 64 | 10.11 | 74 | 11.26 |
| 41 - 45 | 49 | 8.25 | 48 | 8.08 | 55 | 8.69 | 64 | 9.74 |
| 46 - 50 | 48 | 8.08 | 46 | 7.74 | 46 | 7.27 | 44 | 6.70 |
| 51 - 55 | 34 | 5.72 | 44 | 7.41 | 46 | 7.27 | 48 | 7.31 |
| 56 - 60 | 37 | 6.23 | 32 | 5.39 | 34 | 5.37 | 40 | 6.09 |
| 61 - 65 | 17 | 2.86 | 20 | 3.37 | 23 | 3.63 | 23 | 3.50 |
| 66 or older | 6 | 1.01 | 3 | 0.51 | 4 | 0.63 | 7 | 1.07 |
| Total | 594 | 100.00 | 594 | 100.00 | 633 | 100.00 | 657 | 100.00 |

Table 12

Distribution of Female Teachers in Sample, by Age, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| 20 or younger | 9 | 1.69 | 3 | 0.56 | 7 | 1.06 | 8 | 0.99 |
| 21 - 25 | 83 | 15.63 | 71 | 13.27 | 90 | 13.60 | 84 | 10.36 |
| 26 - 30 | 138 | 25.99 | 134 | 25.05 | 150 | 22.66 | 187 | 23.06 |
| 31 - 35 | 79 | 14.88 | 84 | 15.70 | 114 | 17.22 | 176 | 21.70 |
| 36 - 40 | 58 | 10.92 | 69 | 12.90 | 78 | 11.78 | 102 | 12.58 |
| 41 - 45 | 47 | 8.85 | 53 | 9.91 | 75 | 11.33 | 93 | 11.47 |
| 46 - 50 | 51 | 9.60 | 45 | 8.41 | 50 | 7.55 | 55 | 6.78 |
| 51 - 55 | 25 | 4.71 | 38 | 7.10 | 53 | 8.01 | 56 | 6.91 |
| 56 - 60 | 28 | 5.27 | 21 | 3.93 | 26 | 3.93 | 31 | 3.82 |
| 61 - 65 | 11 | 2.07 | 13 | 2.43 | 17 | 2.57 | 17 | 2.10 |
| 66 or older | 2 | 0.38 | 4 | 0.75 | 2 | 0.30 | 2 | 0.25 |
| Total | 531 | 100.00 | 535 | 100.00 | 662 | 100.00 | 811 | 100.00 |

Table 13

Distribution of Male Teachers in Sample, by Years of Teaching Experience, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| no experience | 48 | 8.08 | 52 | 8.75 | 76 | 12.01 | 45 | 6.85 |
| 1 - 2 years | 84 | 14.14 | 80 | 13.47 | 66 | 10.43 | 84 | 12.79 |
| 3 - 4 years | 78 | 13.13 | 56 | 9.43 | 59 | 9.32 | 66 | 10.05 |
| 5 - 6 years | 65 | 10.94 | 74 | 12.46 | 70 | 11.06 | 52 | 7.91 |
| 7 - 8 years | 41 | 6.90 | 54 | 9.09 | 60 | 9.48 | 72 | 10.96 |
| 9 - 10 years | 36 | 6.06 | 34 | 5.72 | 39 | 6.16 | 53 | 8.07 |
| 11 - 15 years | 84 | 14.14 | 79 | 13.30 | 84 | 13.27 | 84 | 12.79 |
| 16 - 20 years | 50 | 8.42 | 57 | 9.60 | 63 | 9.95 | 78 | 11.87 |
| 21 - 25 years | 50 | 8.42 | 45 | 7.58 | 40 | 6.32 | 40 | 6.09 |
| 26 - 30 years | 30 | 5.05 | 37 | 6.23 | 43 | 6.79 | 44 | 6.70 |
| 31 - 40 years | 25 | 4.21 | 24 | 4.04 | 32 | 5.06 | 36 | 5.48 |
| more than 40 years | 3 | 0.51 | 2 | 0.34 | 1 | 0.16 | 3 | 0.46 |
| Total | 594 | 100.00 | 594 | 100.00 | 633 | 100.00 | 657 | 100.00 |

Table 14

Distribution of Female Teachers in Sample, by Years of Teaching Experience, During the School Years 1978-79 to 1981-82

| | 1978-79 | | 1979-80 | | 1980-81 | | 1981-82 | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| no experience | 60 | 11.30 | 48 | 8.97 | 67 | 10.12 | 60 | 7.40 |
| 1 - 2 years | 69 | 12.99 | 75 | 14.02 | 96 | 14.50 | 118 | 14.55 |
| 3 - 4 years | 59 | 11.11 | 55 | 10.28 | 73 | 11.03 | 89 | 10.97 |
| 5 - 6 years | 78 | 14.69 | 65 | 12.15 | 51 | 7.70 | 58 | 7.15 |
| 7 - 8 years | 47 | 8.85 | 56 | 10.47 | 76 | 11.48 | 96 | 11.84 |
| 9 - 10 years | 42 | 7.91 | 39 | 7.29 | 53 | 8.01 | 90 | 11.10 |
| 11 - 15 years | 64 | 12.05 | 84 | 15.70 | 98 | 14.80 | 131 | 16.15 |
| 16 - 20 years | 47 | 8.85 | 51 | 9.53 | 69 | 10.42 | 74 | 9.12 |
| 21 - 25 years | 32 | 6.03 | 30 | 5.61 | 42 | 6.34 | 50 | 6.17 |
| 26 - 30 years | 22 | 4.14 | 20 | 3.74 | 26 | 3.93 | 30 | 3.70 |
| 31 - 40 years | 11 | 2.07 | 12 | 2.24 | 11 | 1.66 | 15 | 1.85 |
| more than 40 years | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Total | 531 | 100.00 | 535 | 100.00 | 662 | 100.00 | 811 | 100.00 |

of the total number of teachers in 1978-79 and 23% in 1981-82. The number of male teachers with 5-10 years experience is 23% of the total in 1978-79 and 27% in 1981-82. Male teachers with more than 11 years of experience are 41% in 1978-79, and 43% in 1981-82. As Table 14 shows, the number of female teachers with no experience is relatively stable, although there seems to be a slight decrease from 1978-79 to 1981-82. The number of female teachers with 1-4 years of experience is also rather stable, 24% of the total number of female teachers in 1978-79, and 25% in 1981-82. The number of female teachers with 5-10 years experience is equally stable, around 31% during the years under study. The number of female teachers with with more than 11 years of experience increases slightly, was 33% in 1978-79 but 37% in 1981-82. Although most of the experience clusters are rather stable, a slight increase seems to occur in all the categories, except that of female teachers with 5-6 years of teaching experience, where there is a decline.

### The Outcome Measures

The outcome measures from 1978-79 to 1981-82 in the four subjects, Icelandic, English, Danish, and Mathematics are shown in Table 15. The number of students undergoing the comprehensive examinations are shown, as are the number of schools that administered the examinations for each year under study. The scores are presented in the form of means,

Table 15

Distribution of Students and Schools with Mean, Standard Deviation, Minimum and Maximum Scores, by Subject, During the School Years 1978-79 to 1981-82

| Subject | School Year | No. of Students | No. of Schools | Score |  |  |  |
|---|---|---|---|---|---|---|---|
|  |  |  |  | Mean | Min. | Max. | S.D. |
| Icelandic | 1978-79 | 4150 | 78 | 42.0 | 24.7 | 58.8 | 7.69 |
|  | 1979-80 | 4084 | 79 | 57.2 | 37.6 | 71.5 | 6.56 |
|  | 1980-81 | 3979 | 85 | 54.8 | 37.5 | 67.5 | 6.54 |
|  | 1981-82 | 3992 | 90 | 58.9 | 40.6 | 68.9 | 5.57 |
| English | 1978-79* | 2729 | 78 | 54.4 | 39.8 | 72.6 | 6.64 |
|  | 1979-80* | 2392 | 76 | 59.0 | 35.0 | 80.8 | 9.42 |
|  | 1980-81 | 3977 | 85 | 52.8 | 18.2 | 80.5 | 10.77 |
|  | 1981-82 | 3996 | 90 | 48.4 | 19.3 | 72.3 | 10.03 |
| Danish | 1978-79* | 1409 | 75 | 47.0 | 19.0 | 79.0 | 11.21 |
|  | 1979-80* | 1651 | 77 | 50.6 | 27.6 | 74.1 | 10.52 |
|  | 1980-81 | 3937 | 85 | 51.7 | 26.2 | 74.6 | 8.64 |
|  | 1981-82 | 3925 | 90 | 40.5 | 22.7 | 60.0 | 7.14 |
| Mathematics | 1978-79 | 4164 | 78 | 36.8 | 12.9 | 63.2 | 9.14 |
|  | 1979-80** | 4063 | 78 | 43.3 | 18.6 | 64.4 | 9.48 |
|  | 1980-81 | 3975 | 85 | 53.5 | 23.9 | 76.5 | 9.19 |
|  | 1981-82 | 3988 | 90 | 44.4 | 23.3 | 63.8 | 7.63 |

* English and Danish were not compulsory in 1978-79 and 1979-80

** Data in Mathematics were missing for one school in 1979-80 standard deviation, minimum, and maximum . The mean is the mean score with its standard deviation of all schools within a subject each year. The minimum and the maximum show the lowest and the highest score within the same subject and year. As stated earlier, all the subjects were compulsory except for English and Danish in 1978-79 and 1979-80. Consequently the number of students and schools is lower during the years when English and Danish were options. An inspection of the school mean scores (raw scores) for each subject indicates that they are relatively stable over the years under study. The mean scores in Icelandic range from 42.0 to 58.9, in English from 48.4 to 59.0, in Danish from 40.5 to 51.7, and in mathematics from 36.8 to 53.5. The mean scores in mathematics seem to be lower in comparison to the other subjects. In Icelandic and mathematics, the standard deviation is rather stable, except for 1981-82 when it is lower in both subjects. The average standard deviation (1978-79 to 1980-81) for Icelandic is 6.6 and for mathematics is 8.9. The school average scores in mathematics may be interpreted as not being as stable as the average scores in Icelandic. In English and Danish, which were options in 1978-79 and 1979-80, schools have similar average mean scores during the years under study. On the other hand, standard deviation in English is lower in 1978-79 and 1979-80 than in 1980-81 and 1981-82, but in Danish it is the opposite, higher in 1978-79 and and lower 1980-81 and 1981-82.

## G. Statistical Procedures

The exploratory and descriptive nature of the study reflected the statistical techniques employed. Besides statistics such as frequencies and means used when describing the sample, the following statistics were employed for objective one and two. In objective one for both the sub-problems, correlation analysis was employed. For sub-problem two the data were transformed into z-scores to provide a comparative basis between years. In objective two, multiple regression analysis was employed for both the sub-problems. Furthermore, one-way analysis of variance was used for discovering significant differences between groups within some of the variables. The test employed was the Scheffe Test with the significance level of p .10.

## H. Summary

In chapter five, the research design was discussed in terms of the nature of the study, the problem, the objectives, and the sub-problems. The study was intended to be descriptive and exploratory and each objective was devided into two sub-problems.

Methodology was discussed in terms of the selection of the sample, data collection procedures, and the treatment of the data.

The number of schools in the sample ranged from 78 in 1978-79 to 90 in 1981-82. The major characteristics or trends in the sample over the school years under study were summarized separately for school and teacher variables.

School variables.

The increase in number of schools offering grade nine seems to be mainly in the Greater Reykjavik area.

Within the variable school type, there seems to be an increase in regular schools. The number of schools in the other categories is rather stable, however.

When schools are classified by grade levels, there seems to be an increase in number of schools offering grades 1-9, and a decrease in others.

The number of schools operating for 8 1/2 months seems to be decreasing, while the number of schools operating for 8 or 9 months increases.

The number of small schools is decreasing, but that of medium sized and large schools is increasing.

Position types show that the majority of male teachers hold fulltime positions, while the majority of female teachers holds part-time positions.

Teacher variables.

The principalship is dominated by males, and most of them are within the age group 31-50 years old.

The majority (two thirds) of male and female teachers are 21-40 years old.

There seems to be a slight increase in teaching experience for both males and females.

# Chapter VI

# ANALYSIS OF THE DATA AND DISCUSSION OF THE RESULTS

In this chapter an analysis of the data and a discussion of the results is presented. The chapter is divided into two major sections; section one where objective one is discussed, and section two where objective two is discussed. Furthermore, each objective is discussed in terms of two sub-problems.

## A. CONTEXT

The fundamental premise of this research project was that there are significant differences in the achievement levels of the comprehensive primary schools in Iceland. This study was delimited to selected teacher and school variables. Also, the study was intended to be descriptive and exploratory in nature.

The data were collected from official documents on approximately 95 schools during the school years 1978-79 to 1981-82.

The major problem under investigation was divided into two objectives and four sub-problems.

## B. OBJECTIVE ONE

As previously stated, the first objective of the study was to search for patterns in attainment by analyzing comprehensive primary school average scores for the school years 1978-79 to 1981-82. This objective was divided into two sub-problems.

It was considered meaningful to use correlation analysis for both the sub-problems in objective one. In sub-problem one, raw scores in the four subjects under study were used in the correlation analysis. In the first place, average scores were computed for individual schools within each subject. Secondly, an average score was computed for all the schools within a subject. This was done for each year under study.

In sub-problem two, average scores were computed for individual schools within a subject in the same manner as in sub-problem one. Then, average scores were computed for each year under study within a subject. However, for a comparative basis between years, the raw scores were transformed into z-scores.

## Statement of Sub-Problem One

Sub-problem one was stated as follows:

> What relationship exists between school average scores in the four subjects (Icelandic, English, Danish, and mathematics) within each school year?

## FINDINGS

In Table 16 the intercorrelation between subjects is shown separately for each school year under study. An inspection of the table indicates that there is a positive correlation between all the subjects during all the four years. In 1978-79 the coefficient ranged from .38 (p .001)

Table 16

Correlation Coefficients between Icelandic, English, Danish and Mathematics for each School Year 1978-79 to 1981-82

1978-79

| | English | Danish | Mathematics |
|---|---|---|---|
| Icelandic | .376***<br>(N=78) | .636***<br>(N=75) | .546***<br>(N=78) |
| English | | .481***<br>(N=75) | .380***<br>(N=78) |
| Danish | | | .516***<br>(N=75) |

1979-80

| | English | Danish | Mathematics |
|---|---|---|---|
| Icelandic | .619***<br>(N=76) | .551***<br>(N=77) | .693***<br>(N=78) |
| English | | .497***<br>(N=74) | .603***<br>(N=75) |
| Danish | | | .359**<br>(N=77) |

1980-81

| | English | Danish | Mathematics |
|---|---|---|---|
| Icelandic | .700***<br>(N=85) | .802***<br>(N=85) | .603***<br>(N=85) |
| English | | .873***<br>(N=85) | .626***<br>(N=85) |
| Danish | | | .676***<br>(N=85) |

1981-82

| | English | Danish | Mathematics |
|---|---|---|---|
| Icelandic | .581***<br>(N=90) | .729***<br>(N=90) | .639***<br>(N=90) |
| English | | .803***<br>(N=90) | .544***<br>(N=90) |
| Danish | | | .666***<br>(N=90) |

*** p < .001
** p < .01

between Icelandic and English, as well as English and mathematics, to .64 (p .001) between Icelandic and Danish. In 1979-80 the coefficient ranged from .36 (p .01) between Danish and mathematics, to .69 between Icelandic and mathematics. As previously stated, English and Danish were options in 1978-79 and 1979-80. The intercorrelation between Icelandic and mathematics in 1978-79 was .55, and .69 in 1979-80. Between Danish and English, the intercorrelation was .48 in 1978-79, and .50 in 1979-80. In 1980-81 the coefficients ranged from .60 between Icelandic and mathematics, to .87 between English and Danish. In 1981-82 the coefficients ranged from .54 between English and mathematics, to .80 between English and Danish. Thus, the most likely outcome would be a high English score if there was a high score in Danish.

## Statement of Sub-Problem Two

Sub-problem two was stated as follows:

> What relationship exists between the school average scores in each subject during the school years under study?

## FINDINGS

As Table 17 shows, the intercorrelation in every subject is positive during the four school years. In Icelandic the coefficient ranges from .47 between 1978-79 and 1981-82, to .67 between 1978-79 and 1979-80. For mathematics the coefficient ranges from .43 between 1978-79

Table 17

Correlation Coefficients between the School Years 1978-79 to 1981-82
for Icelandic, English, Danish and Mathematics

Icelandic

| | 1979-80 | 1980-81 | 1981-82 |
|---|---|---|---|
| 1978-79 | .665***<br>(N=76) | .563***<br>(N=75) | .467***<br>(N=74) |
| 1979-80 | | .603***<br>(N=77) | .533***<br>(N=76) |
| 1980-81 | | | .566***<br>(N=83) |

English

| | 1979-80 | 1980-81 | 1981-82 |
|---|---|---|---|
| 1978-79 | .391***<br>(N=73) | .523***<br>(N=75) | .596***<br>(N=74) |
| 1979-80 | | .687***<br>(N=74) | .535***<br>(N=74) |
| 1980-81 | | | .715***<br>(N=83) |

Danish

| | 1979-80 | 1980-81 | 1981-82 |
|---|---|---|---|
| 1978-79 | .591***<br>(N=74) | .610***<br>(N=73) | .574***<br>(N=71) |
| 1979-80 | | .552***<br>(N=75) | .606***<br>(N=74) |
| 1980-81 | | | .656***<br>(N=83) |

Mathematics

| | 1979-80 | 1980-81 | 1981-82 |
|---|---|---|---|
| 1978-79 | .707***<br>(N=75) | .549***<br>(N=75) | .426***<br>(N=74) |
| 1979-80 | | .696***<br>(N=76) | .535***<br>(N=75) |
| 1980-81 | | | .584***<br>(N=83) |

*** $p < .001$

and 1981-82, to .71 between 1978-79 and 1979-80. The coefficient for English ranges from .39 between 1978-79 and 1979-80, (Note: English not conpulsory these years) to .72 in 1980-81 and 1981-82. In Danish, (Note: not compulsory in 1978-79 and 1979-80) the coefficient ranged from .55 between 1979-80 and 1980-81, to .66 in 1980-81 and 1981-82.

### Discussion

The findings for each of the sub-problems in objective one indicate that there is a relatively strong relationship between subjects as there is within each subject during the years under study. In other words, if school average scores are either high or low, they are likely to remain so. Also, if the scores in one subject are high the scores in the other subjects will be high. This could be labelled the general pattern. Furthermore, it seems as if the intercorrelation increases over the years. For example, the average intercorrelation between the subjects was .49 in 1978-79, in 1979-80 .54, in 1980-81 .71, and in 1981-82 .66. Generally, school effectiveness in fulfilling official and operative goals could be interpreted as increasing.

## C. OBJECTIVE TWO

The second objective of the study was to examine the relationship between selected teacher and school variables, and school attainment (school average scores) during the school years 1978-79 to 1981-82. For investigation, this objective was divided into two sub-problems.

### Statement of Sub-Problem One

Sub-problem one was stated as follows:

> Which of the teacher or school variables are the best predictors of school average scores for each subject during all the four school years under study?

### FINDINGS

The findings for this research sub-problem are discussed for each subject separately. The approach adopted was stepwise multiple regression analysis (see SPSS Manual, 1975 p. 320-367). All the previously stated school and teacher variables were used in the regression except the variable "age of teachers". Because of high correlation between age of teachers and their experience, it was considered meaningful to exclude age and use the average teaching experience for each school (males and females).

### Icelandic

The summary of the regression analysis predicting average school scores in Icelandic are presented in Table 18. Only the most important variables are presented, when the R-squared change exceeded 0.010 . Changes of less than 0.010 in R-squared were considered too small to be of practical significance.

## Table 18

### Proportion of Variance Predicted for the School Average in Icelandic

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.398 | 0.158 | -0.398 | -0.427 |
| 2. Boarding Schools | 0.473 | 0.223 | -0.118 | -0.181 |
| 3. South Region | 0.499 | 0.249 | -0.077 | -0.151 |
| 4. South-West Region | 0.517 | 0.267 | -0.007 | -0.181 |
| 5. Grades 1-9 | 0.532 | 0.283 | -0.059 | -0.145 |
| 6. No. of Male Teachers (2/3 time) | 0.546 | 0.298 | 0.221 | 0.095 |
| 7. North-West Region | 0.557 | 0.310 | -0.143 | -0.141 |
| 8. West-Peninsula Region | 0.570 | 0.324 | -0.201 | -0.122 |
| 9. Boarding/Regular Schools | 0.585 | 0.342 | 0.245 | 0.231 |
| 10. No. of Female Teachers (1/2 time) | 0.596 | 0.355 | 0.204 | 0.301 |
| 11. Size of School | 0.607 | 0.368 | 0.148 | -0.740 |
| 12. No. of Female Teachers (2/3 time) | 0.619 | 0.383 | 0.257 | 0.241 |
| 13. No. of Male Teachers (full-time) | 0.629 | 0.395 | 0.175 | 0.219 |

F ratio = 8.222     Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

Thirteen variables entered the regression equation. The overall F-ratio was 8.222, significant at the 0.00 level, well beyond the 0.01 level. As Table 18 shows, the multiple R for the thirteen predictors is 0.629 and these variables account for 39.5 % of the variance. The variable "coastal areas" (towns, villages, and hamlets) is the best predictor of school average scores in Icelandic during the four years under study. It accounts for 15.8 % of the variance predicting relatively low school average scores in Icelandic.

All the thirteen predictors in Table 18 are measures from the category "school variables". The first four variables, coastal areas, boarding schools, the South region, and the South-West region are geographic variables. All boarding schools in the sample are located in rural areas. The multiple R for these variables is 0.517 and R-squared is 0.267.

The simple R in Table 18 indicates that seven out of the thirteen predictor variables predicted relatively low school average scores in Icelandic.

An inspection of the Beta coefficients shows that when the effects of the other predictors were held constant (standardized regression), the average school scores tended to be as follows:

School Variables

a. lower, if school was located in coastal areas
b. lower, if school was a boarding school
c. lower, if school was located in the South region
d. lower, if school was located in the South-West region

e. lower, if school had grades 1 to 9
f. lower, if number of 2/3 time males was high in school
g. higher, if school was located in the North-West region
h. higher, if school was located in the West Peninsula region
i. lower, if school was a boarding/regular school
j. higher, if number of 1/2 time female teachers was high in school
k. lower, if school was large (number of students)
l. lower, if number of 2/3 time female teachers was high in school
m. higher, if number of full time male teachers was high in school

**English**

The summary of the regression analysis predicting average school scores in English are presented in Table 19. Only the most important variables are presented when the R-squared change exceeded 0.010. Changes of less than 0.010 in R-squared were considerd too small to be of practical significance.

Seven variables entered the regression equation. The overall F-ratio was 8.649, significant at the 0.00 level, well beyond the 0.01 level. As Table 19 shows, the multiple R for the seven predictors is 0.620 and these variables account for 38.4 % of the variance. Greater Reykjavik is the best predictor variable for school average scores in English during the four years under study. It accounts for 28.5 % of the variance.

All the seven predictors in Table 19 are from the category "school variables". Furthermore, all the variables are geographic variables except for school operating time and size of schools.

Table 19

Proportion of Variance Predicted for the School Average
in English

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.534 | 0.285 | 0.534 | -0.042 |
| 2. North-West Region | 0.562 | 0.316 | -0.270 | -0.187 |
| 3. School Operating Time | 0.575 | 0.330 | 0.459 | 0.232 |
| 4. East Region | 0.591 | 0.350 | -0.190 | -0.157 |
| 5. Coastal areas | 0.601 | 0.361 | -0.358 | -0.177 |
| 6. Capital - Reykjavik | 0.610 | 0.373 | 0.474 | 0.373 |
| 7. Size of School | 0.620 | 0.384 | 0.352 | -0.563 |

F ratio = 8.649 Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

The simple R in table 19 indicates that three out of the seven predictors predicted low school average scores in English.

An inspection of the Beta coefficients shows that when the effects of the other predictors were held constant (standardized regression), the average school scores in English tended to be as follows:

School Variables
a. lower, if school was located in Greater Reykjavik
b. higher, if school was located in North-West region
c. lower, if school operating time was 9 months
d. higher, if school was located in the East region
e. higher, if school was located in coastal areas
f. lower, if school was located in the capital region Reykjavik
g. lower, if school was large (number of students)

## Danish

The summary of the regression analysis predicting average school scores in Danish is presented in Table 20. Only the most important variables are presented, when the R-squared change exceeded 0.010. Changes of less than 0.010 in R-squared were considered too small to be of practical significance.

Nine variables entered the regression equation predicting the school average scores in Danish. The overall F-ratio was 8.133, significant at the 0.00 level, well beyond the 0.01 level. As Table 20 shows, the multiple R for the nine predictors is 0.560, and these variables account for 38.4 % of the variance. Greater Reykjavik is the best predictor variable for school average scores in Danish

## Table 20

### Proportion of Variance Predicted for the School Average in Danish

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.461 | 0.213 | 0.461 | 0.062 |
| 2. North-West Region | 0.490 | 0.240 | -0.249 | -0.127 |
| 3. Boarding/Regular Schools | 0.517 | 0.268 | 0.044 | 0.118 |
| 4. South-West Region | 0.540 | 0.292 | 0.044 | 0.020 |
| 5. No. of Male Teachers (1/2 time) | 0.559 | 0.313 | 0.115 | 0.102 |
| 6. Grades 6-9 or 7-9 | 0.572 | 0.327 | 0.150 | 0.110 |
| 7. School Operating Time | 0.581 | 0.338 | 0.386 | 0.185 |
| 8. Size of School | 0.588 | 0.346 | 0.258 | -0.695 |
| 9. No. of Female Teachers (2/3 time) | 0.560 | 0.360 | 0.352 | 0.157 |

F ratio = 8.133     Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

during the four years under study. It accounts for 21.3 % of the variance.

All the nine predictor variables in Table 20 are from the category "school variables". However, the first four predictor variables are geographic variables, and they account for 29.2 % of the variance.

The simple R in Table 20 indicates that only one out of nine predictor variables predicted low school average scores in Danish.

An inspection of the Beta coefficients shows that when the effects of the other predictors were held constant (standardized regression), the school average score in Danish tended to be as follows:

School Variables

a. higher, if school was located in Greater Reykjavik
b. higher, if school was located in North-West region
c. higher, if school was a boarding/regular school
d. lower, if school was located in South-West region
e. lower, if number of male teachers was high in school
f. lower, if school had grades 6-9 or 7-9
g. lower, if the school operating time was long
h. lower, if the school was large (number of students)
i. lower, if number of 2/3 female teachers was high

## Mathematics

The summary of the regression analysis for school average scores in Mathematics is presented in Table 21. Only the most important variables are presented, when R-squared change exceeded 0.010. Changes of less than 0.010 in R-squared were considered too small to be of practical significance.

Table 21

Proportion of Variance Predicted for the School Average
in Mathematics

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.381 | 0.145 | -0.381 | -0.429 |
| 2. Boarding/Regular Schools | 0.427 | 0.182 | 0.265 | 0.130 |
| 3. South Region | 0.454 | 0.206 | -0.080 | -0.204 |
| 4. Grades 8-9 or 9 | 0.477 | 0.228 | -0.106 | -0.229 |
| 5. North-East Region | 0.492 | 0.242 | 0.125 | 0.103 |
| 6. West Region | 0.507 | 0.257 | 0.054 | 0.016 |
| 7. Average Teaching Experience of Male Teachers | 0.513 | 0.263 | 0.042 | -0.146 |
| 8. Capital - Reykjavik | 0.523 | 0.273 | 0.203 | 0.220 |
| 9. Size of School | 0.536 | 0.287 | 0.047 | -0.760 |
| 10. No. of Female Teachers (full-time) | 0.549 | 0.301 | 0.139 | 0.274 |
| 11. No. of Male Teachers (1/2 time) | 0.560 | 0.314 | 0.016 | 0.088 |

F ratio = 6.037     Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

Nine variables entered the equation predicting the school average scores in mathematics. The overall F-ratio was 6.037, significant at the 0.00 level, well beyond the 0.01 level. As Table 21 shows, the multiple R for the nine predictor variables is 0.560, and these variables account for 31.4 % of the variance. "Coastal areas" (towns, villages, and hamlets) is the best predictor variable for school average scores in mathematics. It accounts for 14.5 percent of the variance.

All the eleven predictor variables in Table 21 are from the category "school variables", except variable number seven which is a teacher variable.

The simple R in Table 21 indicates that three out of the eleven predictor variables predicted low school average scores in mathematics.

An inspection of the Beta coefficients shows that when the effects of the other predictors were held constant (standardized regression), the average school score in mathematics tended to be as follows:

School Variables

a. lower, if school was located in coastal areas
b. higher, if a boarding/regular school
c. lower, if school was located in the South region
d. lower, if school was with grade 8-9 or 9
e. lower, if school was located in North-East region
f. lower, if school was located in West region
g. higher, if school was located in Reykjavik
h. lower, if school was large (number of students)
i. higher, if number of full time female teachers was high in school
j. higher, if number of 1/2 time male teachers was high in school

Teacher Variables
a. lower, if average teaching experience of male teachers was high in school

## Discussion

In summary, the findings show that the predictor variables examined in the study account for approximately one third of the variance in the four subject areas under study. It ranges from 31.4% to 39.5%. Generally, the category "school variables" accounts for all the variance in the four subjects. The variables school type, geographical location, region ,and grade levels in school, are the best predictors of school average scores in the four subjects over the years under study.

For further investigation, one-way analysis of variance (Scheffe test) for each subject over the four years under study was employed, allowing comparison between pairs or sets of group means. The significance level 0.10 was employed for the Scheffe test.

### Regions

As Table 22 shows, there are significant differences between achievement scores for each region in the four subjects. The capital region seems to differ from almost all the other regions in Icelandic, English, and Danish. The mean scores (z-scores) indicate that average school marks in the capital region are higher compared to the other regions. For English, the average score for the South-West region is

Table 22

One-Way Analysis of Variance of Icelandic, English, Danish and Mathematics Classified by the Different Regions in Iceland

| Regions | N | Mean | SD | F | p | Significance between groups |
|---|---|---|---|---|---|---|
| | | | Icelandic | | | |
| 1. Capital-Reykjavik | 52 | 0.689 | 0.717 | 7.57 | .00 | 1,4 |
| 2. South-West Region | 41 | -0.019 | 0.955 | | | 1,5 |
| 3. West Region | 38 | -0.030 | 1.060 | | | 1,8 |
| 4. West-Peninsula Region | 28 | -0.659 | 1.184 | | | 1,3 |
| 5. North-West Region | 31 | -0.445 | 0.827 | | | 1,7 |
| 6. North-East Region | 48 | 0.175 | 0.966 | | | 1,2 |
| 7. East Region | 42 | -0.021 | 0.881 | | | 6,4 |
| 8. South Region | 52 | -0.177 | 0.925 | | | |
| | | | English | | | |
| 1. Capital-Reykjavik | 52 | 1.087 | 0.711 | 23.22 | .00 | 1,5; 1,7 |
| 2. South-West Region | 41 | 0.449 | 0.695 | | | 1,8; 1,4 |
| 3. West Region | 38 | -0.084 | 0.708 | | | 1,3; 1,6 |
| 4. West-Peninsula Region | 28 | -0.277 | 1.075 | | | 1,2 |
| 5. North-West Region | 31 | -0.833 | 0.776 | | | 2,5; 2,7 |
| 6. North-East Region | 48 | -0.030 | 0.914 | | | 2,8; 2,4 |
| 7. East Region | 41 | -0.501 | 0.873 | | | 6,5 |
| 8. South Region | 50 | -0.323 | 0.823 | | | 3,5 |

Table 22 (continued)

Danish

| Regions | N | Mean | SD | F | p | Significance between groups |
|---|---|---|---|---|---|---|
| 1. Capital-Reykjavik | 52 | 1.023 | 0.954 | 15.82 | .00 | 1,5; 1,4 |
| 2. South-West Region | 41 | 0.117 | 0.766 | | | 1,7; 1,3 |
| 3. West Region | 35 | -0.187 | 0.655 | | | 1,8; 1,6 |
| 4. West-Peninsula Region | 28 | -0.424 | 1.074 | | | 1,2 |
| 5. North-West Region | 31 | -0.765 | 0.661 | | | 2,5 |
| 6. North-East Region | 48 | -0.008 | 0.933 | | | 6,5 |
| 7. East Region | 42 | -0.300 | 0.937 | | | 8,5 |
| 8. South Region | 50 | -0.057 | 0.836 | | | |

Mathematics

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. Capital-Reykjavik | 52 | 0.467 | 0.694 | 5.18 | .00 | 1,7 |
| 2. South-West Region | 41 | -0.027 | 0.615 | | | 6,7 |
| 3. West Region | 37 | 0.151 | 0.992 | | | |
| 4. West-Peninsula Region | 28 | -0.121 | 1.173 | | | |
| 5. North-West Region | 31 | -0.244 | 1.084 | | | |
| 6. North-East Region | 48 | 0.303 | 1.183 | | | |
| 7. East Region | 42 | -0.543 | 0.968 | | | |
| 8. South Region | 52 | -0.184 | 0.914 | | | |

also significantly higher compared to most of the other regions. Furthermore, the average scores for Danish and English in the North-West region are significantly higher compared to most of the other regions. In mathematics, the only significant difference is between the Capital region and the East region, and East region and the North-East region. The average scores for the regions are highest in the Capital and the North-East regions.

## Geographical Location

The one-way analysis of variance for Icelandic, English, Danish, and mathematics classified by geographical location, is presented in Table 23. Average school scores in Icelandic, English, and Danish are significantly higher in Greater Reykjavik as compared to coastal and rural areas. For mathematics, school average scores are significantly higher in Greater Reykjavik and rural areas.

## School Type

An inspection of Table 24 indicates that school average scores are significantly higher in Icelandic, Danish, and mathematics, in schools that are boarding/regular schools. No significant difference was found between school average scores in English when classified by type of school.

Table 23

One-Way Analysis of Variance of Icelandic, English, Danish and Mathematics Classified by the Geographical Location in Iceland

| Areas | N | Mean | SD | F | p | Significance between groups |
|---|---|---|---|---|---|---|
| | | | Icelandic | | | |
| 1. Greater Reykjavik | 81 | 0.581 | 0.736 | 36.31 | .00 | 1,2 |
| 2. Coastal areas | 148 | -0.441 | 0.937 | | | 1,3 |
| 3. Rural areas | 103 | 0.176 | 0.973 | | | 3,2 |
| | | | English | | | |
| 1. Greater Reykjavik | 81 | 0.929 | 0.696 | 68.23 | .00 | 1,2 |
| 2. Coastal areas | 146 | -0.398 | 0.902 | | | 1,3 |
| 3. Rural areas | 102 | -0.168 | 0.847 | | | |
| | | | Danish | | | |
| 1. Greater Reykjavik | 81 | 0.799 | 0.916 | 49.81 | .00 | 1,2 |
| 2. Coastal areas | 146 | -0.405 | 0.866 | | | 1,3 |
| 3. Rural areas | 100 | -0.056 | 0.848 | | | 3,2 |
| | | | Mathematics | | | |
| 1. Greater Reykjavik | 81 | 0.365 | 0.658 | 27.92 | .00 | 1,2 |
| 2. Coastal areas | 147 | -0.424 | 0.978 | | | 3,2 |
| 3. Rural areas | 103 | 0.318 | 1.015 | | | |

Table 24

One-Way Analysis of Variance of Icelandic, English, Danish and Mathematics Classified by the Type of School

| Groups | N | Mean | SD | F | p | Significance between groups |
|---|---|---|---|---|---|---|
| | | | Icelandic | | | |
| 1. Boarding Schools | 36 | -0.337 | 1.116 | 11.87 | .00 | 2.1<br>2.3 |
| 2. Boarding / Regular Schools | 43 | 0.631 | 0.764 | | | |
| 3. Regular Schools | 253 | -0.059 | 0.972 | | | |
| | | | English | | | |
| 1. Boarding Schools | 36 | -0.185 | 0.915 | 2.92 | .06 | ns |
| 2. Boarding / Regular Schools | 42 | -0.275 | 1.033 | | | |
| 3. Regular Schools | 251 | 0.072 | 0.993 | | | |
| | | | Danish | | | |
| 1. Boarding Schools | 36 | -0.425 | 0.818 | 3.86 | .02 | 2.1<br>3.1 |
| 2. Boarding / Regular Schools | [illegible]3 | 0.114 | 0.974 | | | |
| 3. Regular Schools | 248 | 0.042 | 1.011 | | | |
| | | | Mathematics | | | |
| 1. Boarding Schools | 36 | -0.081 | 1.175 | 12.41 | .00 | 2.3<br>2.1 |
| 2. Boarding / Regular Schools | 43 | 0.682 | 0.997 | | | |
| 3. Regular Schools | 252 | -0.105 | 0.923 | | | |

## Table 25

One-Way Analysis of Variance of Icelandic, English, Danish and Mathematics Classified by the Number of Grade Levels Taught in the School

| Groups | N | Mean | SD | F | p | Significance between groups |
|---|---|---|---|---|---|---|
| | | | Icelandic | | | |
| 1. Grades 1-9 | 205 | -0.046 | 1.056 | 1.78 | .17 | ns |
| 2. Grades 6-9 or 7-9 | 94 | 0.156 | 0.908 | | | |
| 3. Grades 8-9 or 9 | 33 | -0.156 | 0.801 | | | |
| | | | English | | | |
| 1. Grades 1-9 | 202 | -0.094 | 1.069 | 4.09 | .02 | 2,1 |
| 2. Grades 6-9 or 7-9 | 94 | 0.246 | 0.917 | | | |
| 3. Grades 8-9 or 9 | 33 | -0.123 | 0.539 | | | |
| | | | Danish | | | |
| 1. Grades 1-9 | 200 | -0.066 | 1.058 | 4.36 | .01 | 2,3<br>2,1 |
| 2. Grades 6-9 or 7-9 | 94 | 0.235 | 0.913 | | | |
| 3. Grades 8-9 or 9 | 33 | -0.269 | 0.673 | | | |
| | | | Mathematics | | | |
| 1. Grades 1-9 | 204 | 0.012 | 1.096 | 2.06 | .13 | ns |
| 2. Grades 6-9 or 7-9 | 94 | 0.086 | 0.787 | | | |
| 3. Grades 8-9 or 9 | 33 | -0.318 | 0.820 | | | |

## Number of Grade Levels in School

As Table 25 shows, schools that offer grades 6-9 or 7-9 have significantly higher school average scores in English and Danish when compared to schools that offer the grade levels 1-9 or 8-9 or 9. No significant difference was found between school average scores in either Icelandic or mathematics when classified by number of grade levels in school.

## Conclusion

Schools classified by region are considered the most meaningful variable out of the four major variable clusters examined. In the first place, the variable cluster school regions is not as general as the other variable clusters examined. The cluster variable school region is composed of eight sub-variables, compared to the others that are composed of three sub-variables each. Secondly, there is some overlap between the categories examined. The variable clusters; regions, geographical location, and type of shools are all geographical variables. Boarding schools, and boarding/regular schools are almost all in rural areas, and the majority of regular schools are in coastal areas.

In summary, schools that are located in Greater Reykjavik generally have high average scores in the four subjects over the school years under study and the schools located in coastal areas have relatively low average scores. The relatively low average school scores in the

West-Peninsula and the North-West region in Icelandic, English, and Danish are of concern, as mathematics are in the East region.

## Statement of Sub-Problem Two

Sub-problem two was stated as follows:

> Which of the teacher or school variables are the best predictors of school average scores for each subject within each school year under study?

## FINDINGS: A Within Year Comparison

The findings for this research sub-problem are discussed for each year in the four subjects and for individual subjects over the years under study. The findings are not discussed in detail, that is only the major predictor variables will be examined in the discussion.

The approach adopted was stepwise multiple regression analysis (see SPSS Manual, 1975 p.320-360). All the previously stated (see p.8 and 9) school and teacher variables were used in the regression except the variable "age of teachers". Because of high correlation between the age of teachers and their teaching experience, it was considered meaningful to exclude age and use the average teaching experience for each school (males and females).

### The School Year 1978-79

The predictor variables predicting average scores in the four subjects under study in the school year 1978-79 are

Table 26

Proportion of Variance Predicted for the School Average in Icelandic for the School Year 1978-79

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.455 | 0.207 | -0.455 | -0.897 |
| 2. No. of Female Teachers (1/2 time) | 0.530 | 0.281 | 0.327 | 0.380 |
| 3. North-East Region | 0.562 | 0.315 | 0.162 | 0.196 |
| 4. Rural areas | 0.581 | 0.337 | 0.122 | -0.598 |
| 5. No. of Students taking Icelandic Exam | 0.607 | 0.369 | 0.150 | -0.219 |
| 6. Grades 6-9 or 7-9 | 0.635 | 0.403 | 0.207 | 0.455 |
| 7. Boarding/Regular Schools | 0.654 | 0.428 | 0.186 | 0.385 |
| 8. West Region | 0.665 | 0.442 | -0.047 | 0.043 |
| 9. East Region | 0.681 | 0.464 | -0.056 | 0.182 |
| 10. Grades 8-9 or 9 | 0.687 | 0.472 | -0.056 | 0.175 |
| 11. No. of Female Teachers (full-time) | 0.702 | 0.493 | 0.175 | 0.631 |

F ratio = 2.655 Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

### Table 27

### Proportion of Variance Predicted for the School Average in English for the School Year 1978-79

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.531 | 0.282 | 0.531 | 0.465 |
| 2. West Region | 0.578 | 0.334 | 0.111 | 0.383 |
| 3. North-East Region | 0.614 | 0.377 | 0.034 | 0.367 |
| 4. South Region | 0.638 | 0.407 | -0.077 | 0.296 |
| 5. No. of Students taking English Exam | 0.655 | 0.429 | 0.248 | -0.362 |
| 6. Grades 6-9 or 7-9 | 0.663 | 0.440 | 0.110 | 0.248 |
| 7. No. of Female Teachers (full-time) | 0.676 | 0.457 | 0.394 | 0.245 |
| 8. Age of Principal | 0.682 | 0.466 | 0.062 | -0.113 |
| 9. South-West Region | 0.688 | 0.474 | 0.194 | 0.384 |
| 10. Capital - Reykjavik | 0.702 | 0.492 | 0.439 | 0.484 |
| 11. West-Peninsula Region | 0.709 | 0.503 | -0.157 | 0.129 |

F ratio = 2.854 Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

Table 28

Proportion of Variance Predicted for the School Average
in Danish for the School Year 1978-79

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.566 | 0.320 | 0.566 | 0.165 |
| 2. No. of Female Teachers (1/2 time) | 0.609 | 0.371 | 0.448 | 0.340 |
| 3. Boarding/Regular Schools | 0.646 | 0.417 | 0.091 | 0.140 |
| 4. North-West Region | 0.655 | 0.430 | -0.175 | -0.154 |
| 5. No. of Female Teachers (full-time) | 0.667 | 0.445 | 0.280 | -0.014 |
| 6. Capital - Reykjavik | 0.692 | 0.479 | 0.530 | 0.526 |
| 7. Grades 6-9 or 7-9 | 0.700 | 0.490 | 0.113 | 0.042 |

F ratio = 2.471 Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

## Table 29

### Proportion of Variance Predicted for the School Average in Mathamatics for the School Year 1978-79

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.394 | 0.155 | -0.394 | -0.245 |
| 2. South Region | 0.458 | 0.210 | -0.165 | -0.058 |
| 3. West Region | 0.498 | 0.248 | 0.179 | 0.282 |
| 4. No. of Female Teachers (1/2 time) | 0.530 | 0.281 | 0.265 | 0.406 |
| 5. Size of School | 0.570 | 0.325 | 0.037 | -0.828 |
| 6. Boarding/Regular Schools | 0.582 | 0.339 | 0.265 | 0.211 |
| 7. No. of Female Teachers (full-time) | 0.592 | 0.351 | 0.095 | 0.299 |
| 8. Grades 6-9 or 7-9 | 0.602 | 0.362 | 0.022 | 0.205 |
| 9. No. of Male Teachers (1/2 time) | 0.611 | 0.373 | -0.141 | -0.024 |

F ratio = 1.484 Probability = 0.11

* Only includes predictors where the R-Square change was at least 0.010.

presented in Tables 26-29.

Eleven variables entered the regression equation predicting school average scores in Icelandic. The multiple R is 0.702 and these eleven variables account for 49.3% of the variance. In mathematics, nine variables entered the regression equation. The multiple R is 0.611 and these nine variables account for 37.3% of the variance.

In Icelandic and mathematics, the best predictor variable is "coastal areas". In Icelandic it accounts for 20.7% of the variance, and in mathematics 15.5% of the variance.

Eleven variables entered the regression equation predicting school average scores in English. The multiple R is 0.709 and these eleven variables account for 50.3% of the variance. In Danish, seven variables entered the regression equation. The multiple R is 0.700 and these seven variables account for 49% of the variance.

The school average scores in English and Danish (options in 1978-79) are best predicted by the variable Greater Reykjavik. In English it accounts for 28.2% of the variance, and in Danish 32% of the variance.

**The School Year 1979-80**

The predictor variables predicting school average scores in the four subjects under study in the school year 1979-80 are presented in Tables 30-33.

Table 30

Proportion of Variance Predicted for the School Average in Icelandic for the School Year 1979-80

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.418 | 0.175 | -0.418 | -0.348 |
| 2. Boarding Schools | 0.487 | 0.237 | -0.094 | -0.217 |
| 3. South Region | 0.521 | 0.271 | -0.108 | -0.358 |
| 4. Boarding/Regular Schools | 0.542 | 0.293 | 0.302 | 0.307 |
| 5. No. of Teachers on Leave | 0.568 | 0.323 | 0.328 | 0.170 |
| 6. Size of School | 0.593 | 0.352 | 0.102 | -0.312 |
| 7. No. of Male Teachers (1/2 time) | 0.615 | 0.378 | 0.126 | 0.103 |
| 8. No. of Female Teachers (1/2 time) | 0.627 | 0.393 | 0.141 | 0.143 |
| 9. North-West Region | 0.641 | 0.411 | -0.137 | -0.290 |
| 10. South-West Region | 0.650 | 0.423 | -0.009 | -0.268 |
| 11. Grades 1-9 | 0.663 | 0.439 | -0.118 | -0.171 |
| 12. North-East Region | 0.672 | 0.452 | -0.022 | -0.274 |
| 13. No. of Male Teachers (full-time) | 0.680 | 0.463 | 0.195 | 0.309 |
| 14. West-Peninsula Region | 0.688 | 0.473 | -0.141 | -0.216 |

F ratio = 1.923     Probability = 0.02

* Only includes predictors where the R-Square change was at least 0.010.

## Table 31

### Proportion of Variance Predicted for the School Average in English for the School Year 1979-80

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. No. of Teachers on Leave | 0.424 | 0.180 | 0.424 | 0.414 |
| 2. Coastal areas | 0.519 | 0.269 | -0.419 | -0.297 |
| 3. Sex of Principal | 0.544 | 0.296 | 0.113 | 0.204 |
| 4. North-West Region | 0.562 | 0.316 | -0.246 | -0.317 |
| 5. South Region | 0.586 | 0.343 | -0.108 | -0.317 |
| 6. No. of Students taking English Exam | 0.608 | 0.369 | 0.112 | -0.556 |
| 7. No. of Male Teachers (1/2 time) | 0.623 | 0.388 | 0.087 | 0.198 |
| 8. Age of Principal | 0.632 | 0.400 | 0.195 | 0.186 |
| 9. No. of Female Teachers (full-time) | 0.644 | 0.414 | 0.165 | -0.602 |
| 10. Size of School | 0.668 | 0.446 | 0.216 | 0.868 |
| 11. No. of Female Teachers (2/3 time) | 0.682 | 0.465 | 0.275 | -0.221 |
| 12. North-East Region | 0.691 | 0.478 | -0.049 | -0.177 |
| 13. Regular Schools | 0.700 | 0.490 | -0.122 | -0.242 |
| 14. No. of New Female Teachers | 0.709 | 0.503 | 0.041 | 0.194 |

F ratio = 2.164 Probability = 0.01

* Only includes predictors where the R-Square change was at least 0.010.

## Table 32

### Proportion of Variance Predicted for the School Average in Danish for the School Year 1979-80

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.462 | 0.214 | 0.462 | -0.117 |
| 2. North-West Region | 0.516 | 0.266 | -0.309 | -0.352 |
| 3. Rural areas | 0.544 | 0.296 | 0.000 | 0.509 |
| 4. Boarding Schools | 0.599 | 0.358 | -0.206 | -0.525 |
| 5. No. of Female Teachers (1/2 time) | 0.633 | 0.400 | 0.313 | 0.256 |
| 6. Grades 1-9 | 0.654 | 0.427 | -0.131 | -0.256 |
| 7. Capital - Reykjavik | 0.690 | 0.476 | 0.462 | 0.455 |
| 8. No. of New Female Teachers | 0.709 | 0.503 | 0.089 | 0.217 |

F ratio = 2.479 Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

# Table 33

## Proportion of Variance Predicted for the School Average in Mathematics for the School Year 1979-80

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.488 | 0.238 | -0.488 | -0.341 |
| 2. Boarding/Regular Schools | 0.565 | 0.320 | 0.389 | 0.379 |
| 3. No. of Teachers on Leave | 0.595 | 0.354 | 0.235 | 0.260 |
| 4. Grades 6-9 or 7-9 | 0.615 | 0.378 | 0.152 | 0.114 |
| 5. Average Teaching Experience of Male Teachers | 0.631 | 0.399 | 0.034 | -0.176 |
| 6. West-Peninsula Region | 0.642 | 0.412 | 0.032 | 0.055 |
| 7. No. of Male Teachers (1/2 time) | 0.655 | 0.429 | 0.033 | 0.195 |
| 8. No. of Students taking Mathematics Exam | 0.667 | 0.445 | 0.066 | -0.278 |
| 9. South Region | 0.677 | 0.458 | -0.084 | -0.255 |

F ratio = 1.808 Probability = 0.03

* Only includes predictors where the R-Square change was at least 0.010.

Fourteen variables entered the regression equation predicting school average scores in Icelandic. The multiple R is 0.688 and these fourteen predictors account for 47.3% of the variance. In mathematics, nine variables entered the regression equation. The multiple R is 0.677 and these nine predictor variables account for 45.8% of the variance.

In Icelandic and mathematics the best predictor variable is "coastal areas". In Icelandic it accounts for 17.5% of the variance and in mathematics 23.8% of the variance.

Fourteen variables entered the regression equation predicting school average scores in English. The multiple R is 0.709 and these fourteen variables account for 50.3% of the variance. The best predictor variable in English (option in 1979-80) was the number of teachers on leave. It accounted for 18% of the variance.

Eight variables entered the regression equation predicting school average scores in Danish. The multiple R is 0.709 and these eight variables account for 50.3% of the variance. Greater Reykjavik was the best predictor variable for shool average scores in Danish. It accounted for 21.4% of the variance.

## The School Year 1980-81

The predictor variables predicting school average scores in the four subjects under study in 1980-81 are presented in Tables 34-37.

## Table 34

### Proportion of Variance Predicted for the School Average in Icelandic for the School Year 1980-81

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.443 | 0.196 | 0.443 | -0.030 |
| 2. Boarding and Regular Schools | 0.575 | 0.331 | 0.262 | 0.336 |
| 3. Sex of Principal | 0.602 | 0.362 | 0.128 | 0.157 |
| 4. No. of Male Teachers (1/2 time) | 0.621 | 0.386 | 0.144 | 0.073 |
| 5. Capital - Reykjavik | 0.637 | 0.406 | 0.400 | 0.350 |
| 6. No. of Male Teachers (2/3 time) | 0,651 | 0.423 | 0.310 | 0.115 |
| 7. Grades 6-9 or 7-9 | 0.662 | 0.438 | 0.121 | 0.093 |
| 8. East Region | 0.673 | 0.453 | -0.039 | 0.225 |
| 9. No. of New Female Teachers | 0.686 | 0.470 | 0.135 | 0.142 |
| 10. Coastal areas | 0.696 | 0.484 | -0.439 | -0.312 |
| 11. Age of Principal | 0.703 | 0.494 | 0.158 | 0.086 |
| 12. No. of Female Teachers (1/2 time) | 0.709 | 0.502 | 0.284 | 0.298 |
| 13. Size of School | 0.717 | 0.515 | 0.278 | -0.631 |
| 14. No. of Male Teachers (full-time) | 0.726 | 0.527 | 0.308 | 0.390 |
| 15. No. of Female Teachers (2/3 time) | 0.736 | 0.542 | 0.342 | 0.209 |

F ratio = 2.676     Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

Table 35

Proportion of Variance Predicted for the School Average
in English for the School Year 1980-81

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.564 | 0.318 | 0.564 | 0.202 |
| 2. School Operating Time | 0.596 | 0.356 | 0.518 | 0.274 |
| 3. Grades 6-9 or 7-9 | 0.617 | 0.381 | 0.256 | 0.242 |
| 4. Capital - Reykjavik | 0.642 | 0.412 | 0.508 | 0.379 |
| 5. Sex of Principal | 0.656 | 0.431 | 0.075 | 0.224 |
| 6. No. of Male Teachers (1/2 time) | 0.670 | 0.448 | 0.195 | 0.191 |
| 7. West-Peninsula Region | 0.684 | 0.468 | -0.017 | 0.155 |
| 8. North-East Region | 0.693 | 0.481 | -0.014 | 0.135 |
| 9. Coastal areas | 0.703 | 0.494 | -0.343 | -0.158 |
| 10. No. of New Female Teachers | 0.714 | 0.509 | 0.207 | 0.194 |
| 11. Size of School | 0.722 | 0.521 | 0.395 | -0.211 |
| 12. Average Teaching Experience of Male Teachers | 0.731 | 0.534 | 0.218 | -0.246 |

F ratio = 3.663 Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

### Table 36

### Proportion of Variance Predicted for the School Average in Danish for the School Year 1980-81

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.465 | 0.216 | 0.465 | 0.590 |
| 2. South-West Region | 0.513 | 0.264 | 0.012 | -0.394 |
| 3. No. of Male Teachers (1/2 time) | 0.549 | 0.302 | 0.182 | 0.187 |
| 4. Rural areas | 0.584 | 0.341 | 0.012 | 0.051 |
| 5. School Operating Time | 0.613 | 0.375 | 0.422 | 0.347 |
| 6. Size of School | 0.628 | 0.395 | 0.236 | -0.481 |
| 7. Grades 8-9 or 9 | 0.646 | 0.418 | -0.089 | -0.154 |
| 8. Sex of Principal | 0.657 | 0.431 | 0.105 | 0.212 |
| 9. No. of Male Teachers (full-time) | 0.667 | 0.445 | 0.311 | 0.516 |
| 10. No. of Female Teachers (2/3 time) | 0.676 | 0.457 | 0.338 | 0.153 |
| 11. North-East Region | 0.684 | 0.468 | 0.021 | 0.041 |
| 12. Average Teaching Experience of Male Teachers | 0.692 | 0.479 | 0.217 | -0.297 |
| 13. No. of New Male Teachers | 0.704 | 0.496 | -0.099 | -0.281 |
| 14. Regular Schools | 0.714 | 0.509 | 0.020 | -0.337 |
| 15. No. of New Female Teachers | 0.724 | 0.525 | 0.106 | 0.170 |

F ratio = 2.470 Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

### Table 37

### Proportion of Variance Predicted for the School Average in Mathematics for the School Year 1980-81

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.380 | 0.144 | -0.380 | -0.344 |
| 2. Grades 8-9 or 9 | 0.475 | 0.226 | -0.198 | -0.376 |
| 3. Boarding/Regular Schools | 0.531 | 0.282 | 0.359 | 0.157 |
| 4. North-East Region | 0.562 | 0.316 | 0.162 | 0.231 |
| 5. No. of Female Teachers (2/3 time) | 0.590 | 0.349 | 0.235 | 0.206 |
| 6. West-Peninsula Region | 0.613 | 0.376 | 0.063 | 0.136 |
| 7. No. of New Male Teachers | 0.624 | 0.390 | -0.131 | -0.221 |
| 8. Sex of Principal | 0.636 | 0.405 | 0.142 | 0.168 |
| 9. No. of New Female Teachers | 0.647 | 0.418 | 0.132 | 0.074 |
| 10. South Region | 0.658 | 0.433 | -0.061 | -0.097 |
| 11. Average Teaching Experience of Male Teachers | 0.666 | 0.444 | 0.080 | -0.243 |
| 12. No. of Male Teachers (1/2 time) | 0.675 | 0.455 | -0.008 | 0.111 |
| 13. Capital - Reykjavik | 0.683 | 0.466 | 0.261 | 0.141 |
| 14. Size of School | 0.693 | 0.480 | 0.091 | -0.598 |
| 15. East Region | 0.701 | 0.491 | -0.286 | -0.152 |
| 16. School Operating Time | 0.708 | 0.502 | 0.115 | 0.192 |

F ratio = 2.093 Probability = 0.01

* Only includes predictors where the R-Square change was at least 0.010.

Fifteen variables entered the regression equation predicting school average scores in Icelandic. The multiple R is 0.736 and these fifteen variables acount for 54.2% of the variance. In English, twelve variables entered the regression equation. The multiple R is 0.731 and these twelve variables account for 53.4% of the variance. Fifteen variables entered the regression equation predicting school average scores in Danish. The multiple R is 0.724 and these fifteen vaiables account 52.5% of the variance.

The best predictor variable for school average scores in Icelandic, English, and Danish was Greater Reykjavik. It accounted for 19.6% of the variance in Icelandic, 31.8% in English, and 21.6% in Danish.

Sixteen variables entered the regression equation predicting school average scores in mathematics. The multiple R is 0.708 and these sixteen variables account for 50.2% of the variance. The best predictor variable is coastal areas. It accounts for 14.4% of the variance.

**The School Year 1981-82**

The predictor variables predicting school average scores in the four subjects under study in the school year 1981-82 are presented in Tables 38-41.

Thirteen variables entered the regression equation predicting school average scores in Icelandic. The multiple R is 0.641 and these thirteen variables account for 41.1% of

## Table 38

### Proportion of Variance Predicted for the School Average in Icelandic for the School Year 1981-82

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. West-Peninsula Region | 0.308 | 0.095 | -0.308 | -0.272 |
| 2. Coastal areas | 0.391 | 0.153 | -0.291 | -0.262 |
| 3. Boarding Schools | 0.445 | 0.198 | -0.175 | -0.374 |
| 4. South-West Region | 0.495 | 0.245 | -0.113 | -0.205 |
| 5. North-West Region | 0.533 | 0.284 | -0.197 | -0.246 |
| 6. Grades 8-9 or 9 | 0.561 | 0.315 | -0.011 | 0.089 |
| 7. North-East Region | 0.582 | 0.339 | 0.148 | 0.061 |
| 8. No. of Male Teachers (full-time) | 0.595 | 0.354 | -0.041 | -0.162 |
| 9. School Operating Time | 0.608 | 0.369 | 0.202 | 0.100 |
| 10. No. of Male Teachers (1/2 time) | 0.619 | 0.383 | 0.164 | 0.076 |
| 11. South Region | 0.627 | 0.393 | 0.038 | -0.147 |
| 12. No. of Students taking Icelandic Exam | 0.633 | 0.401 | 0.114 | 0.399 |
| 13. Regular Schools | 0.641 | 0.411 | -0.053 | -0.178 |

F ratio = 2.006 Probability = 0.01

* Only includes predictors where the R-Square change was at least 0.010.

## Table 39

## Proportion of Variance Predicted for the School Average in English for the School Year 1981-82

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.611 | 0.373 | 0.611 | -0.280 |
| 2. School Operating Time | 0.652 | 0.426 | 0.588 | 0.306 |
| 3. North-West Region | 0.675 | 0.455 | -0.312 | -0.175 |
| 4. East Region | 0.697 | 0.486 | -0.229 | -0.080 |
| 5. Capital - Reykjavik | 0.711 | 0.506 | 0.552 | 0.560 |
| 6. Size of School | 0.727 | 0.528 | 0.422 | -0.928 |
| 7. No. of Male Teachers (2/3 time) | 0.741 | 0.549 | 0.245 | 0.138 |
| 8. No. of Students taking English Exam | 0.754 | 0.569 | 0.505 | 0.365 |
| 9. No. of Female Teachers (2/3 time) | 0.765 | 0.585 | 0.495 | 0.220 |

F ratio = 4.076     Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

## Table 40

### Proportion of Variance Predicted for the School Average in Danish for the School Year 1981-82

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Greater Reykjavik | 0.376 | 0.141 | 0.376 | -0.066 |
| 2. North-West Region | 0.444 | 0.197 | -0.305 | -0.284 |
| 3. Size of School | 0.483 | 0.233 | 0.134 | -1.227 |
| 4. No. of Female Teachers (2/3 time) | 0.534 | 0.286 | 0.306 | 0.252 |
| 5. West-Peninsula Region | 0.571 | 0.326 | -0.217 | -0.171 |
| 6. No. of Female Teachers (full-time) | 0.604 | 0.365 | 0.264 | 0.493 |
| 7. No. of Male Teachers (2/3 time) | 0.633 | 0.400 | 0.248 | 0.188 |
| 8. No. of Male Teachers (1/2 time) | 0.649 | 0.422 | 0.149 | 0.093 |
| 9. Boarding/Regular Schools | 0.657 | 0.432 | 0.007 | 0.084 |
| 10. No. of Students taking Danish Exam | 0.663 | 0.440 | 0.267 | 0.240 |
| 11. No. of Female Teachers (1/2 time) | 0.671 | 0.451 | 0.101 | 0.311 |
| 12. Grades 8-9 or 9 | 0.683 | 0.466 | -0.094 | -0.129 |
| 13. Capital - Reykjavik | 0.691 | 0.478 | 0.373 | 0.279 |

F ratio = 2.628     Probability = 0.00

* Only includes predictors where the R-Square change was at least 0.010.

## Table 41

### Proportion of Variance Predicted for the School Average in Mathematics for the School Year 1981-82

| Predictor* | Multiple R | R-Square | Simple R | Beta |
|---|---|---|---|---|
| 1. Coastal areas | 0.279 | 0.078 | -0.279 | 0.074 |
| 2. North-East Region | 0.373 | 0.139 | 0.198 | -0.044 |
| 3. Boarding Schools | 0.417 | 0.174 | -0.069 | 0.078 |
| 4. West Region | 0.450 | 0.203 | 0.076 | -0.197 |
| 5. Size of School | 0.463 | 0.214 | -0.003 | -1.111 |
| 6. No. of Female Teachers (full-time) | 0.535 | 0.286 | 0.175 | 0.565 |
| 7. No. of Female Teachers (2/3 time) | 0.551 | 0.304 | 0.131 | 0.192 |
| 8. No. of Male Teachers (1/2 time) | 0.563 | 0.317 | 0.151 | 0.133 |
| 9. Grades 5-9 or 8 | 0.576 | 0.332 | -0.110 | -0.300 |
| 10. No. of Female Teachers (1/2 time) | 0.587 | 0.345 | -0.003 | 0.329 |

F ratio = 1.435    Probability = 0.12

* Only includes predictors where the R-Square change was at least 0.010.

the variance. The best predictor variable is West-Peninsula region. It accounts for 9.5% of the variance.

Nine variables entered the regression equation predicting school average scores in English. The multiple R is 0.765 and these nine variables account for 47.8% of the variance. In Danish, thirteen variables entered the regression equation. The multiple R is 0.691 and these variables account for 47.8% of the variance.

The best predictor variable predicting school average scores in English and Danish is the variable Greater Reykjavik. It accounts for 37.3% of the variance in English and 14.1% of the variance in Danish.

Ten variables entered the regression equation predicting school average scores in mathematics. The multiple R is 0.587 and these ten variables account for 34.5% of the variance. The best predictor variable for school average scores in mathematics is coastal areas. It accounts for 7.8% of the variance.

## FINDINGS: A Between Year Comparison

The comparison between years is discussed for each subject seperately. The findings are not discussed in detail. Only the major predictor variables will be discussed.

## Icelandic

The predictor variables predicting school average scores in Icelandic for each school year independently are presented in Tables 26, 30, 34, and 38.

In 1978-79 and 1979-80 "coastal areas" was the best predictor variable for school average scores in Icelandic, predicting relatively low school average scores. It accounted for 20.7% of the variance in 1978-79, and 17.5% in 1979-80. On the other hand, in 1980-81 Greater Reykjavik was the best predictor variable, accounting for 19.6% of the variance, and in 1981-82 the West-Peninsula region was the best predictor variable accounting for 9.5% of the variance. The second best predictor variable in 1981-82 was "coastal areas" accounting for approximately 6% of the variance.

The school average scores in Icelandic seem to differ in the year 1980-81 from the other years under study. Generally, "coastal areas" was the best predictor variable predicting relatively low school average scores except in 1980-81 when it was the eighth best predictor, only accounting for 1% of the variance.

## English

The predictor variables predicting school average scores in English [1] for each school year independently are presented in Tables 27, 31, 35, and 39.

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[1] English was an option in 1978-79 and 1979-80

During the four years, Greater Reykjavik was the best predictor variable exept for the year 1979-80. The variable Greater Reykjavik predicting relatively high scores accounted for 28.2% of the variance in 1978-79, 31.8% in 1980-81, and 37.3% in 1981-82. The best predictor variable in 1979-80 was the number of teachers on leave. It predicted relatively high school average scores and it accounted for 31.8% of the variance.

In the school year 1979-80, which seems to differ from the other years under study, the variable Greater Reykjavik does not enter the regression equation.

**Danish**

The predictor variables predicting school average scores in Danish [2] for each school year independently are presented in Tables 28, 32, 36, and 40.

In all the four years Greater Reykjavik was the best predictor, predicting relatively high school average scores in Danish. It accounted for 32% of the variance in 1978-79, 21.4% in 1979-80, 21.6% in 1980-81, and 14.1% in 1981-82.

**Mathematics**

The predictor variables predicting school average scores in mathematics for each school year independently are presented in Tables 29, 33, 37, and 41.

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[2] Danish was an option in 1978-79 and 1979-80

In all the four years, "coastal areas" was the best predictor variable predicting relatively low school average scores in mathematics. It accounted for 15.5% of the variance in 1978-79, 23.8% in 1979-80, 14.4% in 1980-81, and 7.8% in 1981-82.

## SUMMARY

In this chapter the analysis of the data and the discussion of the results were presented. The findings were discussed in terms of two major objectives and each objective was divided into two sub-problems.

The major findings for objective one indicate that there is a relatively strong relationship among test scores between subjects as there is within each subject during the school years 1978-79 to 1981-82. In other words, if school average scores are either high or low, they are likely to remain so.

The findings for each of the sub-problems in objective two indicate that the selected school variables used in the study are better predictors of school attainment (school average scores) than the selected teacher variables. Of the selected school variables, geographical variables seem to be in most cases the best predictors. To summarize which of the selected variables was the best predictor of school average scores for each school year individually, or for the four years as a whole, Greater Reykjavik was the one most consistently predicting relatively high average scores. The variable "coastal areas", however, was most consistent in predicting relatively low school average scores.

# Chapter VII

# SUMMARY,CONCLUSIONS, AND IMPLICATIONS

In this final chapter, summary, conclusions and implications of the study are presented. The chapter is divided into three major sections. In section one the summary of the study is presented, subdivided into; (1)the problem, objectives and sub-problems, (2)conceptual framework, (3)the design of the study, (4)summary of the findings, and (5)discussion of the findings in relation to the review of the literature. In section two some conclusions are drawn, and section three presents discussion of implications and recommendations for future research.

## A. SUMMARY OF THE STUDY

### The Problem, Objectives and Sub-Problems

The purpose of this descriptive and exploratory study was to examine the relationship between school attainment (school average scores) of comprehensive primary schools in Iceland and selected school and teacher variables during the school years 1978-79 and 1981-82. To fulfill the study purpose, the major research problem was divided into two objectives. To guide the research, each objective was sub-divided into two sub-problems.

#### Objectives and Sub-Problems

The first objective of the study was to search for patterns in school attainment by analyzing comprehensive primary school scores for the school years 1978-79 to 1981-82. Hence, the following sub-problems were investigated:

1. What relationship exists between school average scores in the four subjects (Icelandic, English, Danish, Mathematics) within each school year?

2. What relationship exists between school average scores in each subject during the school years under study?

The second objective was to examine the relationship between selected teacher and school variables and school attainment (school average scores) during the school years 1978-79 to 1981-82. The following sub-problems were investigated:

1. Which of the teacher or school variables are the best predictors of school average scores for each subject during all the four school years under study?

2. Which of the teacher or school variables are the best predictors of school average scores for each subject within each school year under study?

## Conceptual Framework

Some concepts drawn from the open systems model provided the conceptual framework for the study. Students were seen as inputs into schools and their scores on the comprehensive primary school examinations as outputs affected by forces that act upon them. The forces examined in this study were delimited to selected school and teacher variables during the time period of four school years. Furthermore, schools were seen as organizations concentrating on the fulfillment of official and operative

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goals.

## The Design of the Study

The data collected for the study were records provided by the Ministry of Culture and Education in Iceland. The study was delimited to quantitive data in the form of staff lists (principal and teachers) and statistical records of classes for individual schools. The variables developed from these records were presented in two major variable clusters "school variables" and "teacher variables".

The sample for the study on comprehensive primary schools in Iceland offering grade nine, can be considered the total population of schools that do not especially select their students. The number of schools in the sample ranged from 78 schools in 1978-79 to 90 schools in 1981-82.

The statistical techniques employed reflected the descriptive and exploratory nature of the study. Frequencies, means, and standard deviations were considered as descriptive statistical techniques. Correlation analysis and stepwise multiple regression analysis were considered as exploratory statistical techniques.

## Summary of the Findings

Two major objectives of the study were achieved through research directed at an examination of four major sub-problems. The summary of the findings will be presented for each sub-problem within each objective.

## OBJECTIVE ONE

The first objective of the study was to search for patterns in school attainment by analyzing comprehensive primary school scores for the school years 1978-79 to 1981-82. The first major objective was stated in terms of two sub-problems. The major findings related to each sub-problem are summarized below.

Sub-problem one was stated as follows:

> What relationship exists between school average scores in the four subject areas (Icelandic, English, Danish, mathematics) within each school year?

Correlation analysis between all the subjects indicated that there was a positive correlation between all the subjects during all the four years under study. In 1978-79 the average intercorrelation between all the four subjects was .49, in 1979-80 .54, in 1980-81 .71, and in 1981-82 it was .66. This seems to indicate that the intercorrelation increases over the years under study. This interpretation hints at an increasing gap between high and low school average scores. Furthermore, the findings for sub-problem one indicate that for each individual year school average scores are consistent in the four subjects, whether high or low. For example, if the school average score for a particular school in 1978-79 is high in one subject, it is likely to be high in the others, as well.

Sub-problem two was stated as follows:

> What relationship exists between the school average scores in each subject during the school years under study?

Correlation analysis computed for each subject showed a positive intercorrelation during the four years under investigation. The average intercorrelation in Icelandic was .566, in English .574, in Danish .598, and in mathematics it was .583. This indicates that school average scores in the four subjects are not very different. Also, the findings for sub-problem two indicate that school average scores in each of the subjects, whether high or low, are likely to be stable. For example, if the average score for a particular school in 1978-79 is high in mathematics, it is likely to continue to be high in the following years.

## OBJECTIVE TWO

The second objective of the study was to examine the relationship between selected teacher and school variables, and school attainment (school average scores) during the school years 1978-79 to 1981-82. This second major objective was stated in terms of two sub-problems. The major findings related to each sub-problem are summarized below.

Sub-problem one was stated as follows:

> Which of the teacher or school variables are the best predictors of school average scores for each subject during all the four years under study?

The regression analysis indicated that the predictor variables examined in the study account for approximately one third of the variance in the scores for the four subject areas. In general it was found that the category "school variables" accounted for almost all of this portion of the variance. The variable "Greater Reykjavik" predicted relatively high average scores and the variable "coastal areas" predicted relatively low school average scores. Furthermore, an inspection of the Beta-Weights for all the subjects indicated that in all cases the school average scores tended to be lower as school size increased.

Sub-problem two was stated as follows:

> Which of the teacher or school variables is the best predictor of school average scores for each subject within each school year under study?

The findings for this sub-problem were on one hand discussed for each individual school year, in all subjects, and on the other hand, for each subject over the years under study. In general, the selected "school variables" are better predictors of school attainment (school average scores) than the selected "teacher variables". Out of the selected school variables, geographical variables seem to be the best predictors, in most cases. The variable that most consistently predicted relatively high average scores was "Greater Reykjavik". The variable most consistently predicting relatively low school average scores was "coastal areas".

To summarize the findings for both the objectives, schools in Greater Reykjavik seem to have consistently higher average scores in the four subjects and schools in coastal areas seem to have consistently low school average scores.

## The Findings and the Related Literature

### Synthesis

In this study schools were seen as goal seeking institutions, concentrating on fulfilling their official and operative goals. By using school average scores as indicators of differences in school performance, the findings indicated that school average scores were generally high in the Greater Reykjavik area, and low in coastal areas.

The review of the related literature indicated that the major reasons for differences in student outcomes are twofold. In the first place, student background factors were seen as the major determinants of scholastic achievement. Secondly, it was pointed out that in these classical studies internal life of schools had been ignored, and internal characteristics were the main determinants of scholastic achievement. As pointed out earlier, most of these studies were conducted in the U.S. and it is difficult to compare cross national studies. However, the review of studies on scholastic achievement in Iceland indicated that student background factors account for most of the variance. Generally, the findings of this study consolidate these findings. This does not mean that the "internal life" of schools in Iceland has no effect on student achievement. Firstly, the variables used in this descriptive and exploratory study were proxy variables. This means that they are global measures that substitute for important variables not measured. In other words, "the process underlying the relationship they uncover"(Bridge et al.,1979 p.27) is not clearly understood. Secondly, the study was limited to the variables selected for examination. The fact that school location seems to be the best predictor of scholastic achievement may be interpreted in various ways. However, it is likely that either internal life of schools, the norms in the school environment, or a combination of both, actually underly the relationship of school location and scholastic achievement.

## Interpretations

Previously, it was pointed out that most people agree that schools should provide training for students to participate and function as "normally" as possible in society which by the day becomes increasingly complicated. Counts (1975) says in this context that education has first and foremost a social purpose and is founded in the social heritage at each given time (p.281). In other words, at each given time the school implies values and attitudes considered to be of profit for students in the adult world. Consequently the findings of this study provoke the question whether students in coastal areas have the same impetus for education as students in Greater Reykjavik. By generalizing from the findings of this study the answer would be negative. However, due to the nature of the study the findings are limited to a description without any social explanation. Apple (1980) points out when describing the disadvantages of input-output studies that they "[neglect] the cultural forms and meanings that actually exist in schools"(p.65). Apple touches on the problem in the above statement, but it is likely that the external environment of the school should be included. The study by Willis (1977), Learning to Labor: How Working Class Kids Get Working Class Jobs provides insight in this context. His analysis indicated that working class kids reproduce themselves as working class (p.205). The argument for cultural reproduction is of major importance when trying to explain the findings of this study. By applying the reproduction argument the norms and values on one hand in coastal areas and on the other hand in Greater Reykjavik are reproduced through schools and their social enviroment. In coastal areas (villages, towns and hamlets) it may generally be said that the norms are those of a working class ideology, compared to Greater Reykjavik where the ideology is more middle class. The impetus for education is therefore different in coastal areas compared to Greater Reykjavik. In Greater Reykjavik the existing norms and values can be seen as a reflection of the skills and knowledge required for schooling. On the other hand, the norms and values in coastal areas can be seen as a reflection of skills and knowledge required in the world of labour. A conclusion of the above discussion would be that students in coastal areas are raised in a culture with less overlap of the norms of schooling than in Greater Reykjavik.

## B. CONCLUSIONS

The findings of this study lead to four major conclusions.

In the first place, there seem to be significant differences between the attainment levels of comprehensive primary schools in Iceland offering grade nine. During the time period under study, school average scores in the four subjects were almost consistently highest in Greater Reykjavik and lowest in the coastal areas.

Secondly, schools and their environmental norms are of significant importance in explaining differences in educational outcomes.

Thirdly, a descriptive and exploratory research design is neccessary when investigating determinants on scholastic achievement.

Fourthly, the use of longitudinal rather than cross-sectional data is more meaningful when investigating differences in scholastic achievement.

## C. IMPLICATIONS AND RECOMMENDATIONS

### Implications

As previously stated, the results of this study can be used for policy implications. Allison (1983) said when describing the nature of policy:

> Policy is a primary organizational imperative. It defines the fundamental purpose, direction, and values of an organization. It places limits on the decisions and actions of members. Administrators, then, are intimately concerned with policy (p.1).

The findings of this study can be used as a basis for policy development in the various administrative areas within the educational system in Iceland. The administrative areas within the educational system in Iceland, here discussed within the context of policy, are delimited to regional education school boards, local school boards, and school administrators.

Regional education school boards in cooperation with local school boards which administer educational policy within each region and municipality and are interested in attainment scores, could use these findings as the basis for improvement. Due to the nature of the study, the findings only identify the attainment levels of schools and inform which of the selected variables accounts for the greatest amount of variance in school average scores. Overall, the findings suggested that schools in coastal areas had consistently relatively low average scores compared to Greater Reykjavik, where the school average scores were relatively high. Furthermore, the school average scores in some regions were consistently low or high over the years under study. If interested in improving school average scores, school boards in coastal areas (towns, villages, and hamlets), as well as regional education school boards might develop programs aimed in this direction. Such a revision seems to be needed in the West-Peninsula region and the North-West region, in particular. In general, the variables (proxies) used in this descriptive study indicate that "school variables" account for the greatest amount of the variance. The active elements underlying the difference have to be identified in the school or society, for improvement to be made possible.

The notion that low school average scores need to be improved may, however, not be accepted. It says, for example, in the legislation on comprehensive primary schooling (see p.5) that the school must meet individual needs and give individuals opportunity for intellectual and physical development. Perhaps the difference in school attainment between Greater Reykjavik and coastal areas is "healthy". The needs may be different for intellectual development in coastal areas which may result in low scores on the comprehensive examinations. However, what might be of most importance to school administrators is that "school variables" rather than "teacher variables" account for great proportion of the variance. This may lead to the interpretation that the background of students is likely to be of greater importance than some teacher characteristics in determining the students' outcomes (marks). This does not mean that teachers have no effect, only that background factors are likely of more importance.

## Recommendations

As a result of this study, some questions were developed for further inquiry. These questions are discussed in terms of relevance for educational authorities in Iceland, as well as other researchers interested in further research in this area.

Overall, a recommendation for further research within this study area should include student variables and other variables that are considered meaningful in the schooling process. However, the description of the sample suggested several questions concerning the administrative features of the comprehensive primary system. The following are suggested for further research:

1. The number of principalships held by males is noticeably higher than those held by females. Furthermore, there seems to be little increase in principal positions held by females, during the years under study. This trend should be more fully explored to study its implications.
2. Female teachers are in large numbers holding part time positions, but the majority of male teachers is holding full time positions. This should be more fully explored to study its implications.
3. During all the school years 1978-79 to 1981-82 there seems to be an equal increase in the number of schools that operate for 8 months and 9 months. As previously stated, most of the schools that operate for 8 months are located in smaller towns, villages and hamlets.

Further study should be undertaken to explore the impact of differences in school operating time on scholastic achievement.

4. Shool size, determined by the number of students in each school, indicates that the majority of schools is relatively small. In general, the small schools are located outside Greater Reykjavik. Further study should be undertaken to explore the impact of school size on scholastic achievement

The findings of the study suggest several questions of concern to educational authorities as well as researchers interested in further research within this field of study. The following are suggested for further research:

1. In objective one, it was found that school average scores, whether high or low, are likely to remain so. This trend should be more fully explored to study its implications.
2. Also, in objective one it was found that the intercorrelation between years seems to be increasing. This should be more fully explored and its implications studied.
3. In objective two, the findings in general indicated that school average scores in the subject areas under study are significantly higher in Greater Reykjavik than the coastal areas. This major trend should be more fully explored to study its implications.

These questions are mostly of a general nature. They do, however, provide an example of possible areas for further research. These and other questions that may be developed from this study could be made more specific and detailed according to future researchers' interest.

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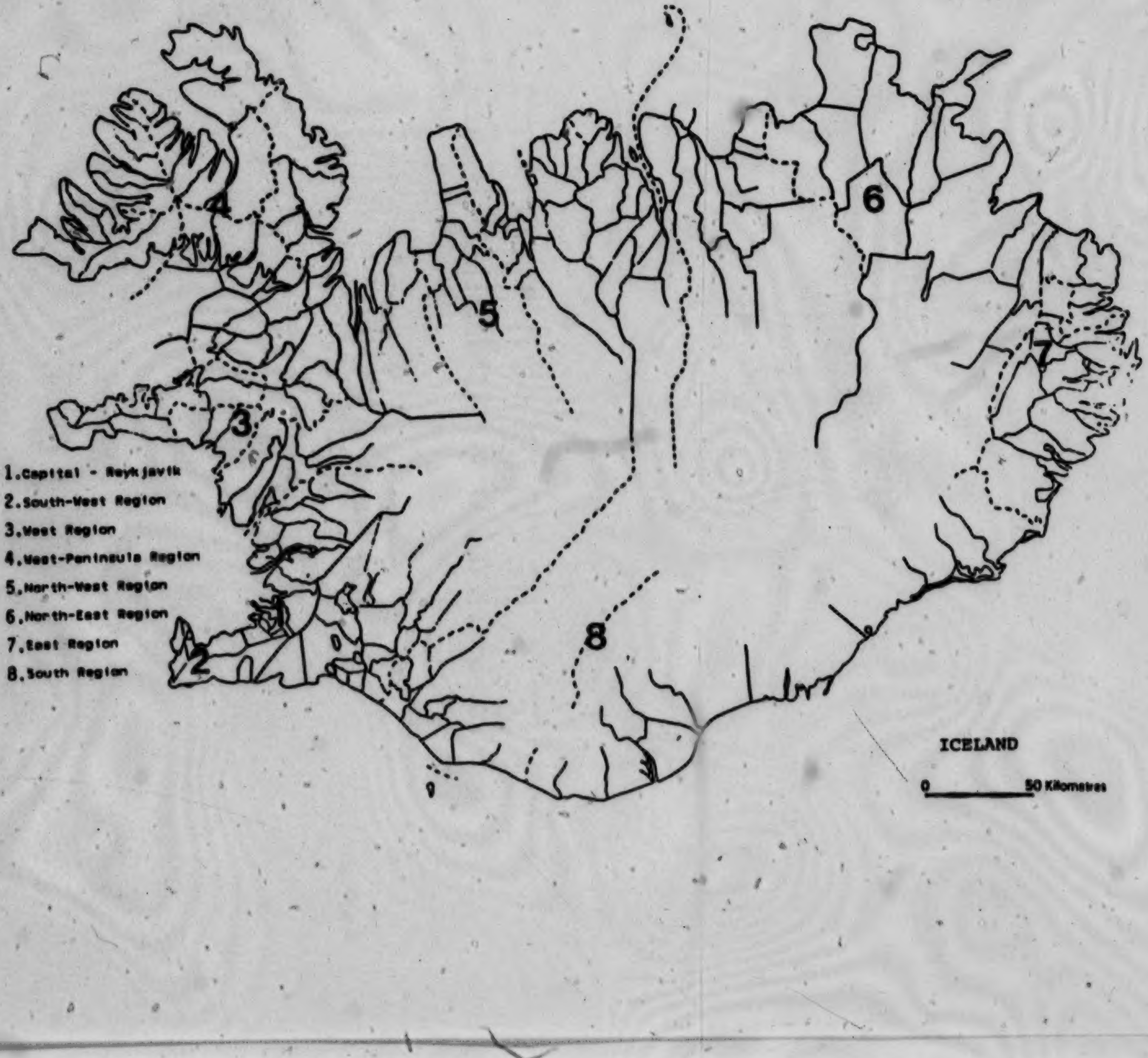
# APPENDIX A.


1.Capital - Reykjavik
2.South-West Region
3.West Region
4.West-Peninsula Region
5.North-West Region
6.North-East Region
7.East Region
8.South Region
1
2
3
4
5
6
7
8
ICELAND
0
50 Kilometres